

THE BATTLE OVER GENESIS

HAROLD W. CLARK



The Origin and Development
of Evolutionary Theory, and Its Continuing
Conflict With Creationism

Evolution didn't start with Darwin! The theory of progressive development of the species (evolutionism) has had an evolutionary history itself. It didn't come full-blown with Charles Darwin's *Origin of Species*. And it is not the same today as it was when Darwin made his voyage on the *Beagle*.

What contribution did the ancient Greeks make to the theory of evolution? What effects were felt by its encounters with Biblical creationism? Why did Darwin's ideas take the Christian world by storm? What are the problem areas today in the creationism vs. evolutionism controversy?

The Battle Over Genesis gives a historical perspective to this key conflict. It is well documented yet highly readable.

The author, Harold W. Clark, has had many years of experience in science teaching, both in the classroom and in the field. He has written numerous books, including *Back to Creation*, *The New Diluvialism*, *Crusader for Creation*, and *Genesis and Science*. He has written science articles for *Signs of the Times* for fifty years.



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and *Genesis and Science*

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Review and Herald Publishing Association
Washington, D.C. 20012

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Cover Photo: Skip Baker

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Library of Congress Cataloging in Publication Data

Clark, Harold Willard, 1891-
The battle over Genesis.

Bibliography: p.

Includes index.

1. Bible and evolution. 2. Creation.
3. Bible. O.T. Genesis—Criticism, interpretation, etc. I. Title.

BS659.C56 231'.7 76-23026

Printed in U.S.A.

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Preface

EVERYONE wonders about the great questions of existence. What is matter? How did the universe get started? What is the soul? Where did we come from, and where are we going?

Whole systems of philosophy have been developed in an attempt to answer these and other equally pertinent questions. Scientific investigators have delved into the various aspects of the problem of existence; leaders of great systems of religion have attempted a solution. And where are we today? Are we any nearer a solution of these age-old questions than men have been in the past? Scientists and theologians have pursued many lines of study in their quest. But throughout the centuries the goal has been elusive, and men are still hunting vainly for satisfactory answers.

Before we enter on this study, certain definitions are in order, inasmuch as there is so much confusion with regard to the terms *evolution* and *creation* and other related terms.

Evolution may be considered under two aspects—materialistic evolution and theistic evolution. According to the first, the changes necessary to develop the universe, the world, and all living things are assumed to be automatic, operating by inherent potentialities, without the necessity of any control or intervention by any power beyond them. The second implies that God not only created matter in the beginning but also has been continually working through it and directing the changes that have brought about the diversity seen in living things today.

Evolution is the philosophy which treats of the evolutionary processes and the results of their action.

These are strict definitions, but to the average reader the term *evolution* covers both phases of the subject. For simplicity we shall, in this discussion, use the simpler term. The reader may apply it as he wishes.

Creation refers to an act or acts of God whereby He brought material substance and living things into existence.

The lines between evolution and creation have become obscured by a number of intermediate interpretations. Certain of these have been claimed alike by evolutionists and creationists.

Deism teaches that God created the primordial substance, endowed it with potentialities for development, and then left it to evolve through that endowment. This view was very popular in the eighteenth century, and many Christians still hold it today.

Progressive creation sets forth the idea that instead of directing processes of evolutionary change, God created new types of living things at different times, so that there have been a series of creations throughout geological time. By this interpretation it is hoped to overcome the problem presented by the fact that the fossils do not show gradations from one type to another. The sudden appearance of new types is attributed to separate creations.

These latter theories face a serious problem regarding the origin of man. Inasmuch as the human body is supposed to have been developed through evolutionary processes, it must be assumed that when some apelike creature reached the point where it was capable of recognizing right from wrong, God endowed it with a soul, and it became a man. Creation in the image of God, as told in the Genesis record, could only apply to the soul, which would have to operate in a body in the image of an ape.

To clarify the situation in the minds of the readers, we shall make a further statement regarding creation—creationism, if you please. It will be noted that in the various intermediate theories we have mentioned, there is a pro-

gressive movement in the direction of intervention by the Deity. This, then, brings us to the ultimate creationism, the theory known as *Special Creation*, or *Direct Creation*. According to this view, God created all living creatures "after his kind," and whatever changes have come about since creation have been *within* the original types, or the "Genesis kinds." Closely associated with the theory of creation is the Flood theory of geology. This is the theory that the Genesis Flood was a world-wide catastrophe. It may be called *diluvialism* (or *diluvianism*, if you prefer). The study of the Flood, especially its scientific aspects, is often called "Flood geology," or "Deluge geology." However, it has not yet reached that state of development where it can rightfully be called a science, and I doubt that it ever will. It is only a model of the action of the Flood described in the book of Genesis.

Whenever the term *catastrophism* is used, it is generally associated in the minds of most readers with the views advocated by Baron Cuvier at the beginning of the nineteenth century, and which were abandoned by virtually all geologists. To avoid confusion, this term will be used sparingly, but when used, it will refer to the Genesis Flood, and not to a series of catastrophes as postulated by Cuvier. (See Chapter 7 for more on Cuvier.)

Our study will be concerned with certain aspects of the subject, namely, the questions of the earth and its life, the changes that have come upon the earth and its life since it came into existence, and the impact of various theories on theology. The whole question may be summarized in a simple statement: Evolution v. Creation. In this statement evolution is defined as any kind of progressive change from simple to complex, whether by inherent or endowed power, or by the direction of God. Creation, as this treatise will deal with it, is the doctrine that the earth and life on it were brought into existence in six literal days, not many thousands of years ago. The very core of religious belief hangs on two questions: (1) Was the earth and its life created by a direct, special act, and (2)

does nature depend on its Creator to maintain its activities, or is it a self-operating mechanism?

Not all authorities consulted agree in their interpretation of certain aspects of the problem nor in their evaluation of the writings of scholars in the past. Therefore, in some cases we shall be obliged to state conflicting views and draw our own conclusions, or even leave the matter without any definite conclusion.

To make the perusal of the text easier, references have been indicated by numbers in parentheses. A complete list of these references will be found at the end of the book. The first number refers to the listed reference; if the reference has more than one volume the volume number is given next, in Roman numerals; the page comes last.

Also, to avoid making the text too heavy with long biographical notes, these are placed at the end in *Biographical Briefs*. These are, indeed, very brief. However, it is always easy to obtain more information, if desired, by referring to some reliable source, such as the *Encyclopaedia Britannica*, *Encyclopedia Americana*, or religious encyclopedias. The *Jewish Encyclopedia* and the *New Catholic Encyclopedia* are especially valuable in tracing the biographies of some of the persons whose ideas are considered herein.

This work cannot, obviously, be a complete history of either aspect of the evolution-creation controversy—biological or geological. Other works have gone into more details, and should be considered if more information is desired. Some books not specifically mentioned in the text are listed in the References, in order to give the reader access to as wide a source of information as possible.

The author does not pretend to be completely neutral on the various questions concerned. An attempt was made to treat all views fairly; nevertheless, the right is reserved to express personal opinions. It is not expected that all readers—evolutionists and creationists alike—will agree

with everything that is said. But the conclusions expressed have been reached after many years of study. It is hoped that what is here presented may lead the readers to a clearer understanding of the great issues that have occupied the attention of mankind from the beginning of history.

HAROLD W. CLARK

Chapter One

Beginnings of Science

OF ALL the philosophies of ancient times, that of Greece has had the greatest influence in modern European and American thought. This is due to two factors. First, the location of Greece placed it in direct line with the stream of advancing civilization, through Rome to Western Europe and America. Second, the logically minded Greeks were less inclined toward mysticism than were the peoples of the East, and certain elements in Greek thought favored the development of science.

The Greek colonies in Asia Minor came into contact with the learning of Egypt and Chaldea. While there was much mythology in this learning, the more practical Greek minds became interested in various lines of scientific inquiry. It was their aim to break down mythology and attempt a comprehensive view of the universe. This attitude was largely responsible for the development of science in the Western world.

In Greece, Asia Minor, and Egypt, as the story begins, all natural phenomena were thought to be directed by the gods. But gradually there grew up the idea that there must be some unifying principle which directed all these natural forces.

The first to search for a universal principle was Thales of Miletus. He lived in the 6th century B.C. About all that

is known of his teaching is that he claimed to have found in water the answer to the problem of existence. To him it seemed to be the originator as well as the sustainer of life. In this modern age this may seem to have little scientific value, yet it did mark an effort to find a rational rather than a supernatural solution to natural phenomena.

One unfortunate movement in ancient times was the development of magic. Magic is the art of producing effects beyond natural human power by means of supernatural agencies or through occult forces in nature. It is very old. Everything that the Egyptians did was influenced by their belief in magic. Their mythology was full of it. Scenes and objects painted on the tombs were looked upon as magical charms. Medicines were mixtures of roots and other parts of plants, without any real knowledge of their properties. Incantations, divination and astrology played a large part in everyday life, especially in religious rites. (12)

This was true also in Mesopotamia. Stars were regarded as gods, hence there arose the "science" of astrology. Divination through the liver, dreams, and other means were common. Incantations were used to ward off evil. Images were made of clay, wax, tallow, etc., and were used to place curses or blessings on the persons the images represented.

There is much dispute as to how much this ancient magic influenced the Greeks. But Plato did acknowledge some of it. He humanized nature objects. He gave a reason for liver divination. He spoke of a harmonious love between the elements as a source of health. He called astrology a controlling force of nature. The stars were divine. Gods returned, after life on earth, to dwell forever on the stars. For Aristotle, also, the stars were divine beings. His *History of Animals* speaks of the influence of the stars on animal life.

It was against this background of magic and superstition that the early philosophers of Greece had to make their way. The story of their endeavors to find a way

through the maze of myth and magic is well worth noting, even though they did not succeed in finding the true scientific background for reality. In fact, it was nearly two millennia before the scientific age really dawned. From the first efforts of the Greeks through this long period of darkness the record is a confused one, but perhaps we can find some elements of value.

Heraclitus of Ephesus declared that not water, but fire, was the ultimate ground of the world. Fire represents the continual change to be observed in nature. But while fire continually changed, there was a unity that did not change, and that was natural law. But where that law came from, he did not understand. God, he said, is in all natural phenomena, in summer and winter, heat and cold, in various forms. Thus he set up a pantheism, with God manifesting Himself through nature, but without any personal existence.

This idea of God was picked up by the scholars in Elea, in southern Italy. What we name God, they said, is the material universe, which holds within itself all natural phenomena. The all-pervading law that governs nature is simply that pantheistic God.

Shortly after the founding of the Eleatic school, another movement arose in Sicily. Empedocles wrestled with the problem of change and fixity, and thought he could solve it by assuming that four elements account for the different characteristics of natural objects. These were earth, water, fire, and air. By varying the combinations of these, the different qualities of natural objects could be explained.

This theory was elaborated by other scholars, and finally Democritus established the atomic theory. He said that there is an unlimited number of elements, or atoms. The word *atom* comes from *a*, without, and *tom*, division; that is, the ultimate particle that cannot be divided. The characteristics of anything, animate or inanimate, depend on the shape, arrangement, and magnitude of the atoms. Everything, he declared, can be explained by

purely mechanical configurations and combinations of these atoms. There is no reason for the idea of an intelligent Providence working through nature.

Greek atomism must not be confused with modern atomic theory. It was a purely logical, philosophical concept, whereas modern atomic theory is based on scientific observation and experiment. Atomism was barren of results, since it was pantheistic and speculative in nature.

In the 5th century B.C. a new movement arose in Greece, which was destined to have far-reaching results, and to have a profound influence on Christianity when it came on the scene. A group of scholars known as Sophists stressed the importance of pure knowledge. In fact, the word *sophist* comes from the Greek word *sophos*, meaning "wise." They questioned all authority, both of social customs, of law, and of morals, and emphasized the importance of individualism in thought and conduct.

"In opposition to the growing individualism of the age, Socrates is the starting point for another tendency, which became more clearly conscious in his successors, Plato and Aristotle. This is the tendency to emphasize the more universal and objective sides of man's life and knowledge." (136:49)

Socrates declared that all man needs is a knowledge of himself. Truth, he said, is obtainable by all men, and if they could only know the truth, they would follow it. Man's place in society would be found by obedience to his individual conscience.

The climax of Greek philosophy is found in what is known as "systematic philosophy." Its two leading proponents, Plato and Aristotle, have been called the most brilliant mental geniuses the world has ever known.

Plato was born in 427 B.C. in one of the most distinguished families of Greece. His chief inquiry was to determine what is good, what is wisdom. He placed principle above pleasure; hence we have the term *plato-*tonic**. Man's nature, he said, has two parts. The lower nature is that of the sensations and desires; the higher is

that of reason. Virtue, he declared, is the health of the soul; without it there is nothing but disease and deformity. What gives meaning to life? he asked; what is the real ideal? Everything has a meaning; it is for us to find it, and thus to give validity to life. (136:93)

In his search for meaning, Plato taught that the only reality was "Idea, or the Good." (136:93) But this "Good" he found impossible to define. The abstract concept of goodness seems to be as close as he ever got to the Hebrew or Christian idea of God.

He taught that the soul was an emanation from the "Good," or from God, as some view it, although whether he ever conceived of God as a personal being is a question. But since the soul came from the eternal reality, it had to be immortal. Here is where Christianity apparently got its concept of the immortality of the soul.

His greatest weakness, perhaps, was in his idea of the background for natural law. While he expressed faith in some kind of supreme "necessity," he showed traces of pantheism in his thinking. The world had a beginning; it was formed from the four elements—earth, water, air, and fire—and a "world soul," whatever that was, had been placed within it. All in all, his concept of "Good," God, and the demiurge, or fashioner of the world, are too vague and uncertain to mean much. He is an example of a brilliant mind searching for truth but failing to find it.

In the 3rd century A.D., Clement and Origen made Platonism the metaphysical foundation of Christian philosophy. Augustine, the greatest thinker of the Church Fathers, was profoundly influenced by Plato, and incorporated many of Plato's ideas into his writings. Plato's teachings, not only in philosophy, but in ethics and morals, have continued to affect Christian scholarship into the 20th century. Details of these influences we shall note in later chapters.

While Plato was destined to exert a powerful influence on the future of theology, he also made some statements that led to the development of scientific notions in

later centuries. This we can see more distinctly in the work of his star pupil, Aristotle.

Aristotle was born in 386 B.C. His father was physician to the king of Macedon. Aristotle received his training in the Academy of Plato, but his later ideas differed from those of his mentor.

While Plato was deeply philosophic, Aristotle had more of a scientific trend in his thinking. He undertook to solve the great problems left by Plato—how the Idea could be translated into practical action. He felt that Plato's concepts of God were too vague. The world is what it is, not because of a stamp imposed on it by some higher Power, but because it has reached its present state by a process of development. All nature is controlled, he asserted, by an inner "necessity" which drives it onward. All nature has within itself the potentiality of development, which brings about a process of *evolution* (Aristotle appears to have invented the word).

His ideas are sometimes characterized as "teleological evolution," that is, evolution with a purpose. In modern terms this would be theistic evolution, evolution under the guidance of God. He conceived of a graded series of existence—mechanical, chemical, organic, vegetative, animal, animal soul, and man. The upward impulse with which God had endowed primeval matter forced it along this upward path. Here he suggests the background for Deism. (136:108, 109)

Louis T. More has commented quite extensively on Aristotle's ideas of evolution, and has criticized the commonly accepted view that there was a connection between his concepts and those of modern evolutionists. We quote:

"If Aristotle had believed and had been able to give any reasons for believing in a system of evolution, he would have been more than a mortal man. To believe in a progressive development by the aid of gradual transitions from the imperfect to a more perfect type within a species is one thing; but to believe that the types of animals

which he knew had developed from previous and different species of creatures which had passed out of existence is quite a different thing. The animals and plants which existed contemporaneously with Aristotle were the only ones which he knew or could know anything about, as he had no collection of fossil remains from which to derive inferences. . . . His perfecting principle of variation worked within the different classes, but he nowhere even suggests that one species of animal may evolve into another; in fact, he expressly denies such a transformation." (99:60-62)

Modern biologists, More says, use the term *evolution* to mean the change from one species to another; Aristotle was merely expressing changes between parent and offspring. To emphasize this point, More quotes directly from Aristotle's *De Partibus Animalium*, Book I, 640a:

"'Propagation implies a creative seed endowed with certain formative properties. . . . It is the possession of certain characters by the parent that determines the development of like characters in the child.'" (99:60-62)

Again we quote from More with respect to the problem of evolution:

"From our knowledge of Aristotle's fixed belief in a Creator who designs all created things for a purpose and uses a perfecting principle in each kind of created things which will continually strive to make each class of objects as perfect as its kind will permit, we can at once understand that Aristotle's idea of evolution is change within the species corresponding to his knowledge that breeders could vary and improve domesticated animals within their species." (99:62)

"We may conclude this discussion of Aristotle's ideas and prove that he was in no sense an evolutionist, but that, on the contrary, he believed that each kind of animal was created for a definite and fixed purpose." (99:63)

Not all agree with More. Ruth Moore states that Aristotle did believe in the change from plant to animal to man, but that his ideas in this area were vague. (98:10)

Aristotle believed in God, and taught that under His direction primitive matter developed into more complexly organized states. Because of this, Aristotle has been labeled a theistic evolutionist rather than a pantheist. It is important to note this, because several hundred years after his time, his ideas played a powerful part in shaping a Christian philosophy of science.

Aristotle could not conceive of inertial motion. He had to postulate a "mover" which acted continuously on the outer sphere of the heaven. This was an immaterial substance. By some kind of attraction it acted on the universe. Perhaps we can see in these ideas a crude grasp of the principle of gravitation which Isaac Newton discovered 2000 years later.

As to Aristotle's scientific work, much might be said. His works are an encyclopedia of the learning of the ancient world. He formed a crude system of classification of plants and animals, which is remarkably similar to our modern systems. Of his biological works, a number have survived. Of these, four are the most important, and they deal with (1) the nature of life, (2) the natural history of animals, (3) the generation of animals, (4) and the parts of animals. These works place him as among the greatest biologists of all time. His powers of observation were keen, and he had clear judgment in recognizing the relationships between different living forms. He labored under the handicap of having no scientific terms by which to describe what he saw; he had to invent his own terms. He is the first to have used the word *species*; it is simply the Greek word for "kind." He applied it to the ultimate classification, that is, the smallest recognizable division of plants or animals.

One more Greek should be noted for his scientific work, Theophrastus. He wrote much on plants, and later botanists drew heavily from his writings.

The Greeks had only a rudimentary knowledge of astronomy. Some said that the stars were hollow bowls filled with fire. The earth floats on water, and is sur-

rounded by air. Outside this are wheels of air or mist. The rims of the wheels are hollow, and are filled with fire. The sun, moon, and stars are glimpses of fires seen through holes in the mist. (138:193)

Aristarchus of Samos, who lived about 280 B.C., put the center of the universe in the sun, and assumed a daily rotation of the earth on its own axis and a yearly movement about the sun. Thus he was 2000 years ahead of modern science in this respect.

To the Greeks, the heavens were a book of religious myths. Each constellation had a god, which exerted some influence on human affairs.

Greek myths, Asiatic mysteries, Egyptian religious secrets, and Jewish religious concepts were in continuous conflict for centuries. Is it any wonder that some of these notions persist in troubling even modern man?

"The best that Egypt and Babylonia had to offer had been assimilated by Greek minds in earlier times; they added little or nothing to that in the last pre-Christian centuries." (138:10)

In the light of this statement, it would be well for modern Christianity to take heed, lest it, too, assimilate pagan notions without realizing their source.

The great speculative systems of philosophy came to a close with Aristotle. Philosophy took a new direction, and for the next few centuries assumed a practical aspect, aiming at a complete mode of life. Any good must be found by each man within himself.

Two great systems, Stoicism and Epicureanism, attempted to solve the problems of morality and truth. Superficially they closely resemble each other, but there are distinct differences. (136:121)

On the one hand the Epicureans substituted a natural explanation for a religious one, basing their ideas on the atomism of Democritus. God, they said, was not necessary. The Stoics, on the other hand, held to the idea of God. However, their philosophy was a materialistic pantheism. God was represented in nature by the

"Logos," a rational principle, which drove nature on to its ultimate destiny, which is perfection, or *virtue*, as they called it.

By many, Stoicism has been characterized as the noblest of all pagan philosophies, because of its emphasis on virtue. However, there were vital flaws in its teachings. Notice the differences between Stoicism and Christianity.

STOICISM

God is power

Ethics must guide man

Self-effort alone will achieve good

Man should be proud of achievement

The soul is immortal

CHRISTIANITY

God is love as well as power

Religious conviction must guide

Trust in God combined with self-effort will achieve good

Man must recognize his dependency on God

Eternal life is a gift of God

One of the problems faced by the Stoics was that of the relation between matter and mind. They reconciled the two ideas by identifying God with the active force in nature. "The result," says More, "is a pure pantheism in which matter is vitalized because God has implanted in it from the beginning . . . a rational seed." (99:68)

One of the most important sources extant for the history of ancient civilization was the *Natural History* written in 77 A.D. by the Roman general Pliny the Elder. It was much more than a natural history. It was an encyclopedia of ancient learning and superstition. It had a great store of misinformation, of legend and magic blended with facts. Pliny's concept of the relation between God and nature is obscure.

"On the whole, while to us today, the *Natural History*

seems a disorderly and indiscriminate conglomeration of fact and fiction, its defects are probably to a great extent those of its age and of the writers from whom it has borrowed. . . . From it we get our background of the confusion of magic and science in the Hellenistic age, and then reveal against this setting the development of them both in the course of the Roman Empire and middle ages. . . .

"In the middle ages . . . Pliny had an undoubted direct influence. . . .

"That the *Natural History* was well known as a whole at least by the close of the middle ages is shown by the numerous editions, some of them magnificently printed, which were turned out from the Italian presses immediately after the invention of printing." (158:I:51-53)

"It is this fact, that virtually his entire work is crammed with marvelous properties and fantastic ceremonial, which makes it so difficult in some places to tell when he begins to draw material from the *magi* and when he leaves off." (158:I:72)

We note a few of the fantastic and nonsensical ideas in the *Natural History*: elephants worship the stars; lions have a sense of gratitude; animals discovered remedies and made use of their discoveries; animals eat certain herbs as cure for poison; the hippopotamus bleeds itself to cure disease; parts of animals have infinite medicinal properties; pig grease has strong virtues because pigs eat herbs; we may receive benefit by simply looking at some herbs; roots must be dug with great ceremony; all kinds of superstitious notions are applied to agriculture; magical properties reside in minerals; the stars can tell the future.

"For him the universe itself is God, . . . and the sun is the mind and soul of the whole world and the chief governor of nature." (158:I:97)

Nowhere do we find a clearer picture of what had happened than in Paul's words to the Romans:

"Though they knew God, they have not glorified him

as God nor given thanks to him; they have turned to futile speculations till their ignorant minds grew dark. . . . They have exchanged the glory of God for untruth, worshipping and serving the creature rather than the Creator" (Rom. 1:21, 25, Moffatt).

When we realize that the little science the ancients did have was so confused with magic and superstition as to be almost worthless, we can understand better what the apostle Paul meant when he wrote to Timothy:

"O Timothy, keep that which is committed to thy trust, avoiding profane and vain babblings, and oppositions of science falsely so called" (1 Tim. 6:20). "Profane and vain babblings" is well put. Moffatt's translation puts it in a very interesting way: "Avoid the profane jargon and contradictions of what is falsely called knowledge."

Chapter Two

Ancient Creation Myths

PROPONENTS of the evolutionary theory have assumed that religion, art, and culture began with the crude and primitive, and progressed to the sophisticated and enlightened. This attitude has been a serious challenge to Christianity. And so, between 1900 and 1935 many scholarly writers attacked evolution, arguing that it was an error. Evolution was regarded as a revival of ancient pagan philosophy. The impact of their efforts was so great that evolutionary philosophy suffered a serious setback for several years.

As research was made into ancient religious systems, the descent from the original doctrine of creation began to be made manifest. It was seen that the earliest views of mankind were of a "hierarchy of spiritual beings organized into a kind of court with one Supreme Being over all." (155:3) God came to be worshiped under different names by different tribes or cities. Different aspects of His character were emphasized in accordance with their personalities. Thus the idea of God was transferred to human traits of character. Then emblems or natural symbols were adopted to illustrate aspects of the Divine Being. Gradually these symbols came to be regarded in the minds of people as having virtue by themselves, and eventually were worshiped. By this process the origin of

idolatry came about, as described by Paul.

According to Schmidt (141:71), belief in the immortality of the human spirit led to worship of ancestors. This supplanted the worship of the Supreme Being. Then the various gods thus set up, were anthropomorphized, or clothed with human characteristics, and images were set up to represent their different aspects of character.

Schmidt shows that the more primitive the culture, the more clearly do the attributes of the Supreme Being show forth. This situation, Custance points out (39:18), can be recognized in all primitive tribes over the earth.

These ancient religious ideas are difficult to decipher, as very meager records have been left. But it seems quite evident that throughout practically all the ancient world the first departure from the doctrine of one God was a turning to some kind of *animism*, or belief that all natural objects are invested with living spirits. All nature was assumed to be alive, and it was this inherent life that activated it. The Pyramid Texts written very early in the history of Egypt, state that the human race emanated from some life force, but they gave no indication as to what that force was.

The doctrine of special creation was changed into cosmogony, or slow development, and this speculation permeated all pagan doctrine as well as later pantheistic church dogma. To pagan thought creation was a slow, self-originating process. World and substance were effusions of the Godhead; matter and God were more or less one. (116:III:298)

Probably no ancient country saw such a pronounced philosophic departure from Bible truth as did India. During the Vedic period, from 1500 to 600 B.C., animism developed into a naturalistic polytheism. The Rig-Veda consisted of hymns, prayers, and spells addressed to the gods. They represent the thought of successive generations of thinkers. As time went on, their deities became more and more disconnected from naturalistic phenomena. Earlier versions had traces of monotheism, but later

versions were much confused.

The Upanishads were the late portions of the Veda. Their aim was to bring peace and freedom to the soul, and it tended toward a mystical philosophy of evolution and logical intelligence. Buddhism arose about this time, and Hinduism became saddled with a multitude of gods of all descriptions.

Some philosophically-minded scholars tried to reduce the number of gods and to unify them. One god of the pantheon was said to have created the world out of his own essence. This would, therefore, be pure pantheism. Some scholars have said that the Indian religious writings were among the most lofty and exalted religious writings ever produced. However, instead of recognizing their supreme god as a personal being, India's religious writers thought of him as merely an essence of power pervading all nature.

In the Indian philosophy evolution took place—matter, intelligence, and soul—in order. The highest spiritual essence was an all-pervading power that controlled, but did not create or destroy.

Various ancient cosmologies are interesting variations on similar themes. In the Persian, Ormuzd created the world in six periods by his words—heavens and light, water, earth, trees, animals, and finally man. This account approximates the Genesis sequence fairly closely. The Etruscans had the world created in six periods of 1000 years each—heaven and earth; firmament; sea and other waters; sun, moon, and stars; animals; and man. Again this is a close approximation of the Genesis story. The Phoenician cosmogony began with chaos, from which arose all seeds or germs of things. These were formed into an egg, which broke into two parts, making the heavens and the earth. Violent thunderstorms gave rise to male and female beings. There is little in this account that aids in understanding the origin of things. (66:I:504) (See this reference for a comprehensive outline of ancient cosmogonies.)

The older Egyptian cosmologies often resemble the Genesis account, but the deities on wall paintings and relief sculptures are bewildering. Each district had its own deity—some animal, reptile, or bird. This was more or less true in all ancient nations.

The Sumerians and the Babylonians could not conceive of a godless universe. Their gods were the product of a natural creative process. None of them was creator in the true sense; they were not the source of existence. Matter itself was assumed to be self-existent and eternal. Gods were born of chaos and struggle. One of the younger gods emerging from this struggle, known as the *Demiurge*, created the earth and men on it, and placed the stars in the sky. This concept of a demiurge was prevalent in many ancient cosmologies. The word means an artisan or craftsman. The demiurge was associated with the presence of evil in the world. Unable to conceive of how God could have created the world with all the evil in it, and having lost sight of the agency of Satan, they developed the idea that matter itself was inherently evil, having been brought into existence by the demiurge rather than by God. This confusion regarding the nature of the material world gave rise to all sorts of vain speculations and superstitions. (59:70,71)

The Babylonian creation story is of interest because some modern scholars think they see in it the source of the Biblical story. However, as we study it, we find it full of mythical and fantastic notions, and hardly fit to be accepted as the true account of the origin of the world. A brief outline only will be given.

The god Apsu, who was the personification of the watery abyss, or chaos, displeased Ea, the god of wisdom. So Ea killed Apsu. This made Apsu's consort Tiamat very angry, and she gathered together the evil gods and sought to avenge the death of Apsu. The good gods appointed Marduk as their champion, and he fought against Tiamat and killed her. Then he took her body, cleaved it, and from it made the heavens and the earth. From the blood of

some of her followers men were created. (122:I:218)

The contrast between this story and the creation record of Genesis is very striking. Whereas the Genesis account is that of God creating a world that He could pronounce "very good," the Babylonian story is that of an evil world and a strife between gods, out of which struggle came the present world and its inhabitants. The very nature of this cosmogony led men to worship the evil gods in an attempt to placate their anger and to obtain peace and tranquillity through offerings to them.

Plato and Aristotle adopted many Babylonian notions, among them the idea that the stars are alive. Modern horoscopes are relics of these ancient superstitions. (158:I:26)

The Greek mind was fertile in imagination, and as the Greeks witnessed many natural processes they could not explain, they associated all natural objects and every phase of human life with some god possessing supernatural powers. Their gods were personifications of water, sky, air, thunder, fertility, trees, moon, rainbow, cattle, fruit, grain, and endless other objects. These all became objects of worship.

"The main function of the Greek religion, as of many others, . . . was to interpret nature and its processes in terms which could be understood. . . . The . . . conceptions in which mythology came to be expressed were of unusual beauty and insight. Each fountain had its nymph, each wood its dryad. . . . From generation to generation the divine figures multiplied, new attributes were assigned to them, and cycles of stories clustered about each name." (41:13)

As time went on, the multiplicity of deities grew so burdensome that scholars in all nations attempted to find some unifying principle that would eliminate the confusion. Thus philosophic inquiry began.

These ancient superstitions offered no systematic explanation of the world and its life. They only led to degeneracy and dissolution of morals. As the forces of

nature were worshiped, it was natural that the powers of reproduction would be regarded as superior to all others. And so nature worship gave rise to all kinds of gross sensuality and licentiousness.

Ashtoreth, or Astarte, known among the Greeks as Aphrodite, was the same as Venus of the Romans. She was the goddess of love, fertility, and was worshiped with prostitution, seduction, rape, and sexual excesses.

Such gods as Osiris and Isis (Egypt), Tammuz and Ishtar (Babylon), and Adonis and Aphrodite (Greece), involved the idea that the union of these couples was necessary for fertility in nature; hence the fertility rites. The seasonal decline and renewal was associated with the supposed death and resurrection of gods. Thus human sacrifice was a representation of the death of the god, and reproduction, with the birth of a new life, of the resurrection. Thus murderous and adulterous rites became essential parts of ancient pagan religions. The truth of creation and the maintenance of nature by the Creator were forgotten.

"The exaltation of nature above the God of nature, the worship of the creature instead of the Creator, has always resulted in the grossest of evils. Thus when the people of Israel, in their worship of Baal and Ashtoreth, paid supreme homage to the forces of nature, they severed their connection with all that is uplifting and ennobling, and fell an easy prey to temptation. With the defences of the soul broken down, the misguided worshipers had no barrier against sin, and yielded themselves to the evil passions of the human heart." (166:281)

It is no wonder that the Hebrew prophets thundered against these excesses, as they were practiced in Israel. They lifted up their voices against the shameless feasting and debauchery, the drunkenness and licentiousness. The first introduction of idolatry into the divided kingdom under Jeroboam led quickly to grosser forms of idolatry, until nearly all the inhabitants of the land engaged in corrupt practices of nature worship.

Moses wrote the book of Genesis about 1500 B.C., and David's throne was established about 1000 B.C. Israel went into captivity around 600 B.C. There is a very significant chronological relation between the religious movements of ancient times and the national history of Israel. Set at the crossroads of international commerce, she was given a position where she might have illuminated the darkness of heathenism, and forestalled the development of the great pagan systems of thought. The leaders of these pagan systems were looking for light; what a tragedy that it was not made available to them! Had Israel fulfilled her destiny and taken the truth of the Creator-God to the world, these false religious systems would have had far less chance to develop.

As we close this short sketch of the ancient systems of pagan thought, someone may ask: What difference does it make to us anyway? To this we may answer that the same dangers face us today, although in a different guise. It is true that civilized peoples today do not worship idols. But in many minds the pantheistic philosophy prevails, and God is dethroned as virtually as He was in ancient times. And, since He is not regarded as the personal God who once spoke the ten commandments, these commandments are no longer regarded as binding, and an individual is left to form his own code of ethics and morality.

The Genesis record of creation is the oldest written cosmogony extant, and in many ways surpasses any of the ancient pagan cosmogonies. Most ancient cosmogonies assume the creation of humanity as a move on the part of the gods to provide beings who could serve them and minister to their needs. On the other hand the Hebrew cosmogony pictures the creation of a home for man, filled with objects to call forth his admiration. It tells of the visits the Creator made to His newly created children. It is a picture of love rather than of strife and death.

It was from the Hebrews that Western civilization got most of its basic religious background. They believed in

one Supreme Being rather than in a pantheon as did other nations.

The simple statement, "In the beginning God created the heaven and the earth" (Gen. 1:1), is sublime in its simplicity. Here we are introduced to God, who was the active agent in creation, the source of all energy and life. And how does He differ from the gods of the pagans? When Moses asked Him who He was, He said: "I AM THAT I AM." Here in a few short words are clearly stated the eternity of God. This explanation is a form of the verb *to be*, known as the reflexive. It turns in on itself, for there is no other to whom it can refer. God is the One beyond whom there is no other, nor any thing.

But, some will say, how much has been gained? The eternity of matter has been rejected, but in its place is the eternity of God. How can God be explained, if He has no beginning? To this we reply that man cannot explain Him; he cannot comprehend Him. God is beyond all efforts of human reason to fathom. But we must start somewhere. At least we start with an intelligent design rather than with blind chance.

"Created"—what does it mean? The word used in the first verse of Genesis is *bara*, which is used in this narrative as referring to an act of God, and to the origin of something not previously existing. It is used three times in the chapter, as follows: "created the heaven and the earth" (verse 1), referring to material substance; "created . . . every living creature" (verse 21); and "created man" (verse 27). Here are three distinct levels of existence—matter, life, and humanity. Man was different from other living creatures because he was created in the image of God (verse 27).

The creation record was accepted by New Testament writers, who after their contacts with Jesus Christ, stated, as did John, that "by him were all things made, and without him was not any thing made" (John 1:3), or Paul, that "he is before all things, and by him all things consist" (Col. 1:17).

As we look about us at the complex civilization, with all its devices for comfort and convenience, we observe that it has all come about by the inventive genius of man. No mechanical construction had been developed by itself. Every machine, every gadget, every tool, instrument, or invention, has required thought and attention. But how about the natural world around us? Is it reasonable to believe that it, with all its complexity, could have come into existence by chance, or without thought and direction of an intelligent Designer? Simple logic, creationists argue, leads us to look beyond nature to its Maker. This is a poor analogy, of course—organisms are much more complex than any machine, and presumably would require even more design and direction.

Modern physicists have thrown light on what creation of matter might mean. In the laboratory they have taken the atom apart, and have found it to be composed of many subatomic parts. Then they have been able to recombine some of these particles to produce new elements that were never known before. Possibly this might be thought of as "creation" in a way, but it must be remembered that all the scientists were doing was to use already existing "particles." (Note that they are called particles, but they are in reality energy units. Where did these units come from?)

It is one thing to combine these energy units to produce a new combination, a new element. But it is a different thing to produce them in the first place. And it is something else to combine nearly a hundred different kinds of atoms into almost endless compounds that make up this complex world. Scientists who boast of "creating" matter in a test-tube must recognize that they are still infinitely remote from creating a world, since they are only resynthesizing materials already in existence.

The Bible statement postulates God as the Creator of the heavens and the earth. And we only have to read Isaiah's invectives against idols to realize how hateful in God's sight is belief in any other God.

And so we have in this simple statement of only ten words (Gen. 1:1), all the essential elements of a complete cosmology—time, agent, action, and extent.

But the Bible record goes even further, for its author tells the purpose of creation of the earth. It was not some fortuitous series of events, some accidental combination of forces, but, we are told, "He created it not in vain, he formed it to be inhabited" (Isa. 45:18). This is clearly implied in the creation record, when God said that He would give to man dominion over every living thing. Here is presented a grand plan and purpose in the creation of the world.

In the Psalms and in Isaiah God's power in nature is proclaimed. Many beautiful passages in these books are in striking contrast with the fantastic tales told of natural events and of animate life in pagan myths. Storms, rain, snow, sunshine, and wind are cited as examples of the beneficent power of the Almighty, and the animal kingdom is pictured as trusting in Him for sustenance.

In the New Testament a fuller revelation of the Godhead is brought to man in the person of Jesus, the Son of God and of man; and the full truth of the Trinity is clearly enunciated by Christ, when He speaks of His relation to the Father and to the Holy Spirit. Again the great truth of the eternity of Christ as a member of the Godhead is stated when He told the Pharisees that "before Abraham was, I am" (John 8:58).

The Old Testament record of creation, the Fall, and the descent from original perfection into confusion, is fully supported in the New Testament.

Thus the pure doctrine of creation became the central theme of early Christianity, and as long as it held pre-eminence, Christianity was free from the influence of pagan religious systems. But unfortunately scholastic influences began to bring into the Church various notions that perverted its purity of thought. The "philosophy and vain deceit" of which Paul warned, had its influence on the understanding of the Scriptures.

Chapter Three

Christianity Invaded by Paganism

GREEK culture as it spread over the world after the conquests of Alexander came into contact with Judaism. Many Greek philosophical concepts were accepted, with the result that Greek teachings became incorporated into the dogmas of some of the Jewish sects. Greek influence from the Alexandrian school in Egypt became a powerful factor in spreading Greek culture in Palestine. The traditional Hebrew concept of God was effectually altered by the philosophic speculations to the extent that the knowledge of the Jehovah God was almost lost, and many of the Jews worshiped a God of Greek origin.

One of the outstanding figures in this movement was Philo Judaeus, or Philo, as commonly known. He lived in the 1st century A.D., but the dates of his birth and death are unknown. He tried to reconcile the Mosaic account of creation with belief in a world soul.

“He did not originate the practice of allegorical interpretation of the Bible but he is our first great extant example thereof.” (158:I:350)

He said that the story of Eve and the serpent was allegorical.

His doctrine of the Logos had a deep influence on the early church theologians. Christians were used to the

term *logos*, as John had used it in his description of Christ as the Logos, or Word, of God. But the Greek concept was quite a different one. It was some kind of an intermediary between God and nature, whereby nature is operated. However, when John spoke of God, he meant the God of the Bible, not of Philo, for the two concepts were different.

Philo is said to have occupied the same position with respect to philosophy and theology that Pliny did in the scientific field, gathering up the past and systematizing it. He was the first to use the term *hexaemeron* to refer to the six-day creation. We shall run across this term later.

As long as the Christian churches retained the simplicity of the early gospel, the world witnessed a revival of morality and religious fervor beyond anything ever known. But when Christianity became popular, the spirit of critical inquiry and the study of philosophy led scholars to organize and codify Christian teachings. In order to be considered intellectual, they turned to secular wisdom to interpret theological principles, and as a result there developed the "falling away" that Paul warned against in II Thessalonians 2:3. The philosophical background for that apostasy we shall now investigate.

Probably the scholar who did the most to corrupt the pure doctrines of the Christian church was Plotinus, who was born in 205 A.D. The place of his birth and his nationality are unknown. He was educated at Alexandria. For 200 years a revived Platonism had been developing, and the philosophical genius of Plotinus took this and fused it with Christianity, under the name of Neo-Platonism. This was the last dying gasp of Greek philosophy, and it faded out in the 6th century A.D. But many of the greatest Christian scholars as well as Islamic scholars were influenced by it.

Neo-Platonism was based largely on Plato's doctrine of "forms" and "ideas." There is an eternal and intelligible world, and a sense world, he said. He taught two great principles regarding the One, or Good. First, there

is intellect, or pure intuitive thought, and second, the soul, which connects mind with material. The sole object of men is to return to the Good, by detaching themselves from worldly desires. There is a strong likeness here to the fundamental doctrines of modern Christian Science.

But Plotinus held other ideas that did much to establish mysticism in the Christian world. He believed in the world soul. The stars not only have souls, but have intellectual processes far above that of man, near to the world soul. He often calls them gods. It is evident, he said, that the motions of the stars affect things on earth. The universe is full of various powers, some more powerful than others. All things are full of signs, and wise men can predict from stars and birds, by virtue of the harmony existing in all nature.

"Plotinus arrives at practically what was to be the usual Christian position in the middle ages regarding the influence of the stars, maintaining the freedom of the human will and yet allowing a large field to astrological prediction." (158:I:306)

Neo-Platonism included ideas from Mithraism, the greatest opponent of Christianity. Beneath its rites and legends primitive nature worship appeared—the worship of the sun, moon, and stars.

"*Theology of Aristotle*," a paraphrase by Plotinus, and translated into Arabic in the 9th century, established Arabic mysticism, a doctrine of oneness with God, which implied a pantheistic relationship. Greek sources produced mystic impulses in Christianity. Gregory of Nyssa propounded a Christian mysticism whose goal was a vision of God. Augustine found in Neo-Platonism an instrument for describing the return of the soul to God.

Plato's doctrine of the world soul was carried on by the Stoics, who exerted considerable influence on Judaism and early Christianity. They regarded the entire universe as a living whole, and described this life power as soul, mind, reason, fire, ether, or *pneuma*.

"This conception of a universe that is alive and per-

vaded by a soul or by rational and divine forces is presupposed in the religious contemplation of the universe that forms an essential part of Hellenistic culture." (115:XIV:1027)

"With the Stoics the *pneuma* is the physical and rational principle of order and generation in the world, . . . sustained as it is by a force . . . that they . . . identify with God." (115:XIV:1027)

It was the work of Plotinus that led to the establishment of this sort of mysticism in Christianity. He said that the world soul emanated from the One, the transcendent Being. An unbroken line runs from Plato through Plotinus and medieval mysticism down to our time. Thomas Aquinas said that the soul loses its attachment to all material things and passes through the experience of the cross to union of fire with fire. (52:XV:1131)

The New Catholic Encyclopedia (115) suggests that the world soul was similar to the doctrine of the Holy Spirit. Some early Church Fathers held this view, but Augustine did not.

The doctrine of the world soul still persists in some concepts of modern times, such as the idea that all nature is alive. This is commonly known as *hylozoism*, or still more generally, *materialism*. According to this view, all facts about life, mind, and will and the course of human history are dependent on physical processes alone, without any reference to God or any higher power. Materialistic evolution is a natural outgrowth of this philosophy. For as human life is supposed to have evolved from animal and plant life, so it in turn has come from simpler matter. Evolution is therefore nothing more than Plato's world soul in modern scientific clothing.

The two men most influential in developing a purely naturalistic interpretation of the order of creation were Gregory of Nyssa and Augustine, Bishop of Hippo in North Africa. Gregory thought that creation took place not literally, but potentially. God imparted fundamental laws and properties to nature, and under these laws the

universe gradually developed out of chaotic matter.

Origen and Clement were outstanding leaders in the Eastern churches. Origen was an Egyptian who wrote in Greek. He was strongly influenced by the Alexandrian school, and succeeded Clement as head of a school of philosophical theology. Clement and Origen, since they could not vindicate the Scriptures against the Greek philosophy, introduced many mystical interpretations of Scripture like those being taught at Alexandria.

Origen, in an attempt to vindicate Christianity against paganism, said that God's nature is essentially good, that the creature is free, that the cosmos is dependent on the continual exercise of divine power. In these points was much good. But he taught the pre-existence of souls, some of which fell and became angels, men, and devils, according to their degree of wickedness. But redemption will restore all souls to blessedness, for all will eventually be saved.

While he opposed the casting of horoscopes from the stars, yet he shows traces of the pagan superstition of worshiping them. He grants reasoning faculties and prophetic powers to the stars, and he directs men to the fact that the sun, moon, and stars pray to God through His Son. Pierre Huet (1630-1721), in his commentaries on Origen, said that he stated that the stars are reasoning beings, honor God, and pray to Him, and are capable of sinning. And yet, Origen, in his *Commentary on Genesis*, attacks the practice of praying to the stars. They do not have the power to control human affairs, but are signs that God has set up, that men may learn His will. To him, Genesis was allegorical, not literal. There is much confusion and superstition in Origen's writings.

The allegories of Origen blended more or less with Neo-Platonism, and spread over the Christian world. They permeated the sermons of Ambrose, who had an influence in converting Augustine of Hippo to the Christian faith. One whose writings did much to counteract the mystic influences of Clement and Origen was

Basil, known as The Great. Born about 329 A.D., he was brother to Gregory of Nyssa, and was famous for the organization of monasteries. He did advocate the use of pagan literature in the education of Christian youth. It must not be condemned as a whole, he said, but from it should be extracted that which is good. His *Hexaemeron* was a treatise on the days of creation; he believed the record of Genesis was to be taken literally.

Basil's writings seem to have supplanted all earlier treatises in Greek. Latin translations spread to the West. He drew largely from Greek science but when Greek science disputed Genesis, he rejected the science. He did, however, accept anything in Greek science for which he did not find any contradiction in Genesis. He believed in the fixity of species, but thought that some animals came by spontaneous generation. (158:I:485, 493)

Augustine was born in 354 A.D., and spent his earlier years in Carthage. In later life he spent much time in Rome and Milan. He was a very dissolute youth, but upon conversion wholeheartedly applied himself to the development of Christian dogma. His writings were a powerful influence in establishing the supremacy of the Catholic Church, and his works are still studied in theological schools.

His views are of particular interest to us, as he attempted to explain creation in a way that would agree with the Hebrew Scriptures and the Greek philosophical ideas. His doctrine of God and creation was couched in terms of Neo-Platonic philosophy. He equated the trinity of Plotinus with the Godhead of the Scriptures. One of the problems he attacked was that of the relation between God and material substance. Greek philosophers had vacillated between a pure materialism that assumed the eternity of matter and a pantheism that explained material substance as nothing more than an emanation from God Himself, therefore part of God. But Augustine recognized the God of the Bible as the supreme Creator, and introduced an idea that has been a basic dogma of

Christianity ever since his day.

“Augustine rejected the original Platonic doctrine of the coeternal principles of Spirit and matter and the Neoplatonic doctrine of ‘emanations.’ These he replaced with creation *ex nihilo*. ‘Thou, O Lord, didst make the world of formless matter, and this thou didst make . . . out of nothing.’—Confessions, xii, 8.8.” (51)

“Therefore out of nothing didst Thou create heaven and earth.” (4:I:177)

“Why . . . may we not understand that that formless matter . . . and the darksome deep, have been made by God out of nothing.” (5:I:184)

Thus matter was not to be considered as having any existence or powers of its own, but to be dependent on the creative and sustaining power of God.

While Augustine is generally credited with establishing the doctrine of creation *ex nihilo* in Christian theology, he was not the first to suggest it. Around the year 200 A.D. two Christian scholars advocated the idea, apparently to meet the growing influence of Greek philosophy. The first one to write on the subject was Theophilus, Bishop of Antioch. His work induced Tertullian, a prolific Christian apologetic writer, to take up the theme. In his *Adversus Hermogenes* he rejected the claim that God had created the world out of pre-existing matter. (156:III:36)

While Augustine is supposed to have taught that God created matter out of nothing, as even his own words testify, Aquinas accused him of saying that “create is to make something by bringing it forth from what was already existing.” Just what Augustine did mean may be hard to determine, although his own words seem clear. Apparently Aquinas read into them some other meaning. And it is important to note that the Protestant Reformation followed Aquinas’ traditional understanding of creation, and incorporated it into the orthodox teachings of Protestantism. And so the matter of how the world was created still remains a subject of controversy.

When Augustine spoke on the subject of the days of creation, his ideas are difficult to interpret. He is cited as having introduced evolution into Christianity, which claim is denied by some who have studied his writings.

We shall give both sides of the question. Here are some of his own words:

"For in these days the morning and evening are counted, until on sixth day, all things which God then made were finished. . . . What kind of days these were is extremely difficult, or perhaps impossible for us to conceive." (4:1:208)

"'It is more than probable,' he says, 'that the seven days of Genesis were entirely different in their duration from those which now mark the succession of time. . . . The seventh day had no evening; it means therefore a period of time; the other six are likewise.' *Literal Commentary on Genesis*, iv. 18." (51)

As to whether Augustine taught evolution or not, we quote from two Catholic sources. The 1907 edition of the Catholic Encyclopedia praises him for his "extreme prudence" in determining the meaning of Scripture. It says:

"*We must be on our guard against giving interpretations which are hazardous or opposed to science, and so exposing the word of God to ridicule of unbelievers. . . .* An admirable application of this well-ordered liberty appears in his thesis on the simultaneous creation of the universe, and the gradual development of the world under the action of the natural forces which were placed in it. Certainly the instantaneous act of the Creator did not produce an organized universe as we see it now. But, in the beginning, God created all the elements of the world in a confused and nebulous mass (the word is Augustine's—*Nebulosa species apparet*), . . . and in this mass were the mysterious germs . . . of the future beings which were to develop themselves, when favorable circumstances should permit." (18:11:90)

This statement has been taken by some as certain evidence for the evolutionary views of Augustine. Note

the following comment:

"To Augustine . . . [we] may be referred for a sound and thoroughly modern theistic concept of evolution. . . . He distinctly rejected the Mosaic idea of a six-day creation in favor of the teaching which, without violence to language, we may call a theory of evolution." (120:26)

However, authors in the New Catholic Encyclopedia might well be considered better judges of his teachings, and we quote from this recent work, dated 1967:

"Augustine's teaching, on the seminal reasons (*rationes seminales*), [a term borrowed from the Stoics for the seeds of life], sometimes regarded as a forerunner of modern evolutionary theory, is essentially, an attempt to reconcile . . . God's creative act with the progressive appearance of new living things throughout the course of time. . . . Newly emerging forms of life were already present at the moment of creation, not in their actual state but in a seminal potential, and causal condition." (115:I:1064)

"In his explanation of the origin of species, Augustine introduced the Stoic idea of 'seminal principles' or 'seeds' which God implanted in matter and which in process of time 'germinated' into all the different material forms. But he did not countenance any idea of transformism or the evolution of one species from another in the course of their development, which some early Greek philosophers had advocated." (51)

"Plainly as the direct and instantaneous Creation of animals and plants appeared to be taught in Genesis, Augustine read this in the light of primary causation and gradual development from the imperfect to the perfect of Aristotle." (119:69)

The great Church authority, Thomas Aquinas, has this to say about Augustine's creation views:

"As to the production of plants, Augustine holds a different view . . . for some say that on the third day plants were actually produced, each in his kind—a view favoured by the superficial reading of Scripture. But Au-

gustine says that the earth is then said to have brought forth grass and trees *causaliter*: that is, it then received power to produce them.'” (119:75)

It may be difficult to harmonize these diverse statements, but possibly the solution lies in the difference between development from a primitive condition and evolution as we now understand it. Each species could undergo its own particular type of development, without any mingling of types. But this would not be evolution in the modern sense.

Augustine's *City of God* represents the transition from classical to medieval thought. With him attempts to interpret Genesis according to Aristotle reached their climax. His allegorical interpretations of Scripture became orthodox. Speaking of Augustine's philosophy, More says: “He . . . embraces the philosophy of the Stoics because it was the most influential of the contemporaneous schools of thought, and because the principles of conduct of the Stoics most nearly resembled that of the Christians.” (99:91)

Yet, even though he accepted the ethical philosophy, he rejected, as we have seen, the Stoic idea of long cycles of time, unless we might interpret his statement regarding the length of the days of creation as such. It is extremely difficult to know just what he did believe on this matter.

Other scholars, particularly the Syrian monk Pseudo-Dionysius, completed the Neo-Platonic interpretations of the Bible teaching and set up a hierarchy of supernatural beings from God down to the divine government here on earth. This “vast theological-cosmological system of Christianized Neo-Platonism” (51) was a powerful factor in the establishment of the authority of the Roman Catholic Church.

The Christian Roman Empire, from 500 A.D. onward, took the attitude that study of natural phenomena would detract from religion. Scholars became engrossed with reconciling Christian doctrine with Greek philosophy.

Chapter Four

Dark Days of Mysticism

WE HAVE noted previously the efforts of Philo of Alexandria to harmonize Jewish religious ideas with Greek philosophy. Now, as we survey the development of religious philosophy in the Christian church, we are led to wonder what has happened to the Jewish scholarship. Did they follow the same path as the Christians? Or what did they do?

For nine centuries after Philo, Jewish philosophy ceased, but it was revived by the translation of Greek philosophy into Arabic in the 9th century. Rational Jewish theologians adopted the Stoic teaching. They followed the atomism of Democritus and Epicurus, and developed a theology of continuous creation. Some followed Neo-Platonic ideas. Many of their works contained Neo-Platonic philosophy. Its influence on medieval Jewish theology was strong.

“The task of the Jewish philosophers of the Middle Ages was to reconcile the teachings of Judaism with the current Aristotelian philosophy. The Jewish idea of creation . . . was that of the intervention of God to produce material existence where there was none before (*creatio ex nihilo*); the philosophical idea was that matter was eternal and that all things had arisen out of some natural law.” (161:III:396)

To the Greeks, philosophy and science were one, but in the Middle Ages both were bound up with theology.

We now turn to another area of thought that exerted a profound influence on the science, philosophy, and theology of Europe in the Middle Ages, and carried on down to some extent into the modern period—the learning of the Islamic scholars, or Arabic learning, as it is generally known.

In the 7th century Islam overran much of the Middle East and Northern Africa, and extended its power into Eastern Europe and Spain. It was in many ways closely related to Christianity and Judaism, as Mohammed claimed descent from Abraham, and many Christian teachings were incorporated into Mohammedanism. Islamic philosophers made a fusion of Greek philosophy, Judaism, and Christianity, and developed a distinctive Arabic system of thought. In all this development Aristotle was considered the greatest of all sources of thought, and Arabic philosophy reflects his ideas strongly.

From Cordova in Spain and from Constantinople Arabic learning was taken into Europe. In the 13th century it was taught in the universities of Paris, Oxford, and Cambridge. By 1300 Aristotle was acknowledged “master of those who know.” His influence in Europe prevailed for 200 years. And, although the Italian Renaissance turned to Plato, and the German Reformation denounced Aristotelianism, yet Aristotle was revived again in the 19th and 20th centuries in the philosophy of modern “evolutionism.” By this I mean the philosophy of evolution, not any particular scientific evolutionary theory.

The work of the Arabic scholars revolved around two great questions, the nature of the universe, and the nature and immortality of the soul. The first of these involved questions of creation *versus* evolution, and associated with the second were problems of ethics, politics, and the nature of mind and intelligence. Astrology was accepted as valid, and elaborate discussions took place regarding the souls of the stars and the intellects that rule the astral

spheres. Thus Arabic learning became a peculiar mixture of fact and fiction, of religion and superstition and magic. It was at its height from 800-1100 A.D.

One of the greatest of the Islamic scholars was Avicenna, who lived and taught in Persia. He said that God was the First Cause, and that emanating from Him were soul, body, and intellect. He also taught uniformitarianism in natural processes, and gradual development of life. Thus his ideas may well be said to have foreshadowed modern theories of evolution.

From God, the First Cause, came endless emanations and endless degradations. Stars have souls. Human beings are a lower grade of emanation.

Averroes is considered the most influential of all the Arabic scholars. From his writing came what is called Latin Averroism, which was taught in the European universities. It placed reason and philosophy above faith. Many of the students in the European universities went to Baghdad and Cordova to study, and brought back much of the Arabic learning. In some instances this aroused opposition from the Church authorities. In 1209 the Church Provincial Council in Paris forbade the study of Arabic writers, and included in the interdict Aristotle's *Natural Philosophy*.

Averroes taught that there was a creation of the world of spirits and of matter, and that every individual had an eternal and universal intellect. One "soul" pervades all mankind. He was accepted as authority on Aristotle at Paris and Oxford from 1230 onward.

The following statement gives us a good view of Arabic philosophy:

"According to the Koran, Allah created and upholds the world, which has only a secondary existence in His absolute existence. This orthodox view was modified by Greek philosophy, Neo-Platonic and Aristotelian, as well as by another Islamic school of thought. The latter added to the implied unilateral pantheism of Muhammad, the Neo-Platonic endless chain of existence, and the Aristo-

telian idea of the Cosmos. Thus it arrived at the complementary view that conversely Cosmos is God. A third group, trying to explain nature in orthodox Muhammadan terms, reached a theory of time, similar to, if not derived from, the Buddhist atomic philosophy of India. The world is made of atoms all exactly alike, which Allah creates anew from moment to moment. Space too, is atomic, and time is composed of indivisible 'nows.' The qualities of things are accidents, which belong to the atoms and are created and re-created with them by Allah. If Allah were to cease from re-creating from moment to moment, the Universe would vanish like a dream. Matter exists by Allah's continued will, and man is but a kinematographic automaton. Thus the apparently godless system of Epicurus is converted into an intense monotheism." (41:71, 72)

Another aspect of ancient and medieval philosophy was that of astrology. When the Greeks, in the 4th century B.C., embraced astral gods from Mesopotamia, planetary lore was accepted along with the Mesopotamian gods. Heavens were regarded as full of the life of the gods. Horoscopes were invented in the 6th and 5th centuries B.C. In the 3rd century divination by the stars was introduced to the Greeks. Plato and Aristotle accepted astrology. Each part of the body, they believed, is under the influence of the stars. Thus pseudo-medicine was set up.

Pagans believed in the omnipotence of the stars; Christians believed in the omnipotence of God. But astrological views were continued with Christian limitations. They were revived by Charlemagne and with the spread of Islam. They were strong in the 13th century, and were taught in the universities of Paris, Padua, Bologna, and Florence, where chairs of astrology were set up. Humanism encouraged astrology. Melancthon, Tycho Brahe, and Kepler accepted the astrological world view. Today it has the attention of millions but little influence in the scientific field.

"It is impossible here to trace a tithe of the enormous and intertwined tangle of astrology, alchemy, magic, and theosophy which enmeshed the Middle Ages, and is so difficult for us to understand or even read with patience." (41:82)

The medieval mind was fascinated with the analogy between (1) the nature of God, (2) the nature of man, and (3) the nature of the Cosmos. (1:81)

But although we find it difficult or impossible to understand all these wanderings of philosophy, theology, magic, and superstition during the Middle Ages, we must pause a moment to give the Arabic scholars recognition of a certain amount of scientific learning which they contributed to the European intellectual scene, and which had great influence in the eventual development of science when the time was ripe.

One of the most important contributions was the use of "Arabic" numerals. These were not originated by the Arabic scholars, but were imported from India. As early as 650 A.D. reference was made to the use of Indian numerals in Mesopotamia, and by the 8th century they were carried to Europe. These were of great value, for Roman numerals could never lend themselves to scientific computation.

Medieval Latin had no scientific vocabulary, and used transliterated Arabic words. Thus many of our scientific terms are derived from the Arabic.

It is claimed that Arabic sailors were the first to use the magnetic compass, although some claim that the Chinese were its inventors. But the Chinese claim is largely legendary, with little or no proof.

The Arabic world became the center for mathematical studies. They were especially proficient in the development of algebra. The most influential algebraic work was published in Baghdad about 825 A.D. Arabic scholars introduced algebra into Europe in the 13th and 14th centuries. There it was further developed, particularly in Italy. The use of letters as algebraic symbolism was

introduced by the French mathematician Francois Vieta in 1591, and Descartes in 1637. Others expanded the use of symbols, including such mathematical geniuses as Isaac Newton.

Throughout the Middle Ages scholars of the Arabic world and of Europe concerned themselves with alchemy. This took two turns, (1) the attempt to transmute baser metals to gold, and (2) the use of gold as a healing agency. Alchemy was drawn from the Alexandrian school, and was full of magic and superstition.

The alchemists did, however, discover new chemicals such as the caustic alkalies, and they discovered new methods of distillation. About the 10th century the trend was toward mystical and allegorical interpretation. Nevertheless there developed an interest in medicine, and the greatest contribution made by the alchemists was the study of vegetable drugs. One of the greatest of the alchemists was Paracelsus, a Swiss physician. His system was based on Neo-Platonic philosophy. He introduced mineral baths, and made opium, mercury, lead, sulfur, iron, arsenic, and copper sulphate part of the pharmacopoeia, and used tinctures and alcoholic extracts. In spite of his ignorance and superstition he rendered a service to medicine by establishing the role of chemistry in medicine, even though some of his remedies were more harmful than beneficial.

In closing this chapter on the Dark Ages, we begin to wonder whether the light of truth will ever shine. Like the ancient prophet we exclaim:

"Watchman, what of the night? The watchman said, The morning cometh, and also the night; if ye will enquire, enquire ye" (Isa. 21:11, 12).

And so we will enquire, to see what the morning (and the night) will bring forth.

Chapter Five

The Birth of Modern Science

THE WORKS of Augustine laid the foundation for the theology of the Catholic Church, and his philosophy made it supreme in all phases of thought. However, the Augustinian theology was not favorable for the advancement of science. For a thousand years after the fall of Rome scientific development depended largely on the efforts of Arabic scholars. But light was destined to come, and when the Church leaders called for the Crusades, from the 11th to the 14th centuries, to drive the heretics out of the Holy Land, results were quite different than they had anticipated. The Church hierarchy had become powerful because of the submission of the common people to the authority of the clergy, but the Crusades stimulated individualism of thought. Widespread interest in learning led to the establishment of many universities. The influx of Arabic books and manuscripts brought in not only a certain amount of scientific knowledge, but caused a revival of the study of Aristotle.

Church leaders became alarmed at this revival of Aristotle. Although their outstanding theologians had drawn heavily from Aristotle and his ideas, as interpreted by Neo-Platonists, the authorities were concerned over the fact that this new wave of enthusiasm on the part of the masses would not be to the best interests of Church

power. The clergy were afraid of the rationalistic and pantheistic views, and attempted to condemn the study of Aristotle. But finally, seeing that their efforts were unsuccessful, they decided to reinterpret Aristotle themselves, and so to establish him as the supreme authority in philosophy, according to their own ideas.

Thomas Aquinas, the "angelic doctor," became the outstanding advocate of Catholic Aristotelianism, and under his direction Catholic philosophy was settled for the future, or so it was thought. While most of Aquinas' views have persisted into the modern period, certain interpretations were eventually modified as new knowledge developed. His main argument was that reason must be subordinate to faith. Building on this premise, he asserted that philosophy must be subordinate to theology. Thus was established a dualism, with philosophy and reason on one side and faith and theology on the other, and the latter with supreme authority over the former.

This dualism saved the day for the authority of the Church, for it had far-reaching influence on the scientific era that was soon to open. At first any scientific views that were feared to be subversive by the Church were condemned. As an example of this attitude was the trial of Galileo in 1616 for declaring that the earth moved around the sun. Although some writers claim that he was not condemned for his scientific views, but for the political application he made of them, the fact still remains that he was forced to retract because he stubbornly challenged the established authority of the Church leaders.

In time the dualism set up by Aquinas resulted in the doctrine that science and religion belong in different categories. A man may believe what he pleases in scientific matters, just as long as this belief does not threaten the authority of the Church in religious matters. The extremes to which this trend may go is illustrated by some current arguments that the Bible statements regarding the origin of the world are of no scientific value whatsoever, since the Bible is meant to teach religion, not

science. Those who advocate such a view overlook the fact that although not intended to teach *details* regarding science, yet, being inspired by God, the Bible, when it speaks of scientific matters, must speak truthfully.

Bruno was burned in 1600 because of his attitude to the Church, and because he held ideas of "magic" that were considered heretical, and not for his science, for he was not a scientist.

Science from the 12th to the 16th centuries was limited almost entirely to alchemy, astrology, medicine, and a little mathematics. These were studied to discover the influence of the stars and chemicals on spiritual life and to relieve man of disease and death. The Middle Ages had only three true scientists, Roger Bacon, Leonardo da Vinci, and Copernicus.

Roger Bacon, son of a wealthy English family, lived from 1220 to 1292. He was well educated, and lectured at the faculty of arts at Paris. He spent huge sums of money on research. He wrote several encyclopedic works on mathematics, alchemy, astronomy, and optics. He did not contribute much new in these lines, except the concept of experimental study. Philosophically he was a follower of Aristotle, not the Neo-Platonists.

Leonardo da Vinci was a Florentine artist and scientist, who lived from 1452 to 1519. He worked on architecture and bridge-building as well as painting. Probably his most famous painting was the Last Supper, on the wall of the monastery in Milan. His Mona Lisa hangs in the Louvre, in Paris. He left many notebooks of drawings of anatomical figures, native sketches, and architecture. He is the first man on record to interpret fossils as remains of former life.

Nicolaus Copernicus was a contemporary of da Vinci, living in Poland in the early part of the 16th century. He was educated in Poland and Italy, returning to his native land after receiving his academic degree. There he became interested in astronomy and made observations on the movements of the sun, moon, and planets. His studies

led him to be dissatisfied with the Ptolemaic system, which assumed that these bodies revolved around the earth. This system, developed by the Alexandrian astronomer and mathematician Ptolemy about 150 A.D., was used by most astronomers of the time to account for the retrograde movements of the planets by the theory of epicycles. Not only did they revolve around the earth, but they had secondary revolutions around centers along their general orbits. This system of epicycles had become so cumbersome by the time of Copernicus that he decided that it was erroneous. He substituted in its place the theory that the sun was the center of the solar system, and the planets all revolved in regular orbits around it. The moon revolved around the earth. In 1530 he circulated a commentary on his views. In 1533 Pope Clement was favorably impressed by his theory, and a few years later Cardinal Schonberg expressed great admiration for Copernicus. This was as a preface to the *Book of Revolutions*, which was published in 1543. From these facts it can be seen that the Church did not initially oppose the theory of the movement of the earth around the sun.

The ideas of Copernicus were picked up by the Italian mathematician and astronomer Galileo, who died in 1642. He was the first to use the newly invented telescope to study the stars. By his observations he amassed evidence to support the Copernican theory. But although he had become converted to the Copernican system early in life, he hesitated to make his convictions known, and continued to teach the Ptolemaic astronomy as late as 1606, as a surviving manuscript shows. He was afraid that the Aristotelian professors of astronomy would subject him to the same ridicule they had given Copernicus.

The ecclesiastical authorities favored his ideas; he became a protégé of Cardinal de Monte; the Jesuits honored him, and Pope Paul V received him. But the professors refused to look through his telescope, and enlisted the cooperation of the Dominican preachers to charge that the Copernican theory contradicted the Scriptures. Cali-

leo was denounced to the Inquisition and brought to trial, and in 1616 was forbidden to write or speak on the subject of the revolution of the earth. For several years he was kept in "house arrest" at his home near Florence.

But the matter was not settled; Galileo's friends backed him up while his enemies tried to silence him. The principal point of contention seemed to be that the university professors feared for their authority. Cardinal Bellarmine, general of the Jesuit Order, stated the official position of the Church by saying that it was permissible to teach the Copernican system as a working hypothesis. But to call it an established truth was dangerous and calculated only to arouse the scholastic philosophers and theologians. (79:21)

Contrary to the advice of Bellarmine, Galileo went to Rome to try to force a decision. But he did not succeed. However, his admirer, Cardinal Maffeo Barberini, became Pope Urban VIII, and gave Galileo six audiences and favors. The Pope gave him permission to write on the Ptolemaic and Copernican systems as long as he discussed them noncommittally and reached conclusions agreeable to the ecclesiastical authorities.

And so he returned to Florence and for a number of years worked on a dialog of the two systems. When this was published in 1632 it created a furor, for the authorities claimed that it was a powerful defense of the Copernican system. This argument, to which Pope Urban had given support, was only a part of the dialog. Much of it was concerned with matters with which Galileo challenged the scholarship and authority of the ecclesiastics, and by which he insulted and provoked them.

He was again summoned to Rome, in 1633. He was ordered to recant, and was kept under arrest for the next eight years. The story is told, how true we cannot say, that after he had recited the formula of recantation dictated to him, as he left the room, he bent down and whispered to a friend: "But it does go around, just the same."

This "scandal" has been said to be "one of the historic

causes which made post-Renaissance Europe a divided house of faith and reason." (79:21) Koestler says: "The Galileo scandal marked a turning point—a hardening of the fronts, the polarization of rigid orthodoxies. . . . The blame was not all on one side; . . . the presumption of the theologians was matched by the *hubris* of an unbalanced genius and the vindictiveness of the benighted academic coterie." (79:29)

During the last eight years of his life Galileo continued intensive research, and did much to anticipate the coming scientific revolution. In fact, it has been said that the modern period of scientific research really began with him. He stands along with Tycho Brahe, who did much work on planetary motion, and with Johannes Kepler, who in the early 17th century stated the laws of planetary motion.

In the 17th and 18th centuries three lines of thought ran parallel, that of the naturalists, the speculative philosophers, and the natural philosophers. It was the naturalists who paved the way for true scientific development, and away from the vagaries of philosophical speculation. A few of the early naturalists are worthy of attention at this time.

William Harvey, in 1632, described the work of the heart and the circulation of the blood. This was one of the greatest accomplishments of science. Marcello Malpighi, in the latter 17th century, studied the anatomy of the silkworm, and did pioneer work on embryology, and was particularly noted for his studies on the anatomy of plants. Nehemiah Grew made marvelous drawings of plant anatomy. Jan Swammerdam is noted for his studies on insects. Anton van Leeuwenhoek and Robert Hooke contributed to the development of the microscope, without which modern biology could never have made any important advancement.

Of all the men of this time, probably the name of Isaac Newton stands out most prominently. He was a mathematician and physicist. He developed an early form of

differential calculus, and did much work on the telescope and on optics. The nature of light was one of his important fields of study. But his most momentous discovery was that of the law of gravitation. His *Principia*, or *Mathematical Principles of Natural Philosophy*, laid the foundation for modern mathematical science.

"The *Principia* set the seal to Newton's reputation. It explained for the first time the way in which a single mathematical law could account for phenomena of the heavens, the tides and the motion of objects on the earth. The whole development of modern science begins with this great book. For more than 200 years it reigned supreme; popular theories of cosmology were based on the principles laid down by Newton. His mechanics guided astronomers and men of science in their search for natural knowledge." (52:XVI:419)

Newton was a religious man; he wrote on the prophecies, and extensively on theology. He declared that there is a Being who is incorporeal, living, intelligent and omnipresent. He intervenes in nature. Note this:

"God constitutes absolute space and time, by His omnipresence and eternity, but He is not identified with them." (115:X:428, Art. Newton)

As defined in the dictionary, *constitute* means to form or create, or set up. Therefore this statement regarding the theology of Newton makes it clear that he was a consistent theist, not a pantheist or deist.

There was one unfortunate result of Newton's work, however, but it was not his fault. As science developed, many, particularly those engaged in physical science, took Newton's discoveries regarding the reign of law in nature to signify that natural law could operate independently of any higher Power. Thus they set up a materialistic philosophy that left God out of the picture. They failed to recognize the source of natural law. Law requires a lawgiver; it does not establish itself. So in nature, law cannot exist as an independent entity; it must be derived from some higher authority.

Besides the famous men we have been considering during this period, proponents of another movement gave great stimulus to the advancement of science by the establishment of museums and scientific societies and journals. Collections of animals in Naples, Florence, Paris, and other cities marked the beginning of the idea of zoos for the enlightenment of the public. The British Museum was established about 1759, and has grown to be one of the largest in the world. In 1626 Cardinal Richelieu set up the *Jardin du Roi* (later *Jardin des Plantes*) in Paris, and it has played a prominent part in the rise of modern botany as well as zoology.

Of the many scientific societies we might mention the first, the Academy of the Lynx, in Italy in 1609. It was so named because the lynx was supposed to have very keen vision. One of the members of the society invented the word *microscope*. The first monograph on the *Natural History of America* was prepared by the society. Unfortunately this group was short-lived, but its place was taken by others.

In London the Royal Society was organized in 1646. In 1668 the Academy of Sciences was founded in France. Studies that contributed to the advancement of science were made by these organizations.

A second group of scholars, the speculative philosophers, while witnessing the growth of science, failed to grasp the true spirit of inquiry, and tried to interpret natural laws in terms of Aristotelian and Arabic philosophy. They were guilty of many vagaries, such as Oken's theory of "Ur-Schleim" from which all life had arisen. All these philosophers were adherents of Greek philosophy, with a veneer of 18th century progress, but they were either out of date or outside the track of advancing thought. Their ideas had no support in observation, nor did they understand the inductive method. Theirs was a purely deductive, speculative philosophy.

The speculative philosophers did develop a few ideas that were later picked up by Darwin, such as chance

occurrence being responsible for the development of new species, and isolation and natural selection as agents in speciation. But they did not carry their ideas far enough to make them of any scientific value. They clung to the outmoded Aristotelian notions, such as the unfolding of pre-existing germs, the tendency to perfection, the gradual change from lower to higher degrees of organization, and the transmission of acquired characters. As a rule their theories were too vague, too mystical, and so far behind the advancing front of science that their influence was comparatively valueless. Comparatively, we say, for there were some ideas propounded by them that later scholars picked up and shuffled about, with more or less success.

The third group of scholars, the natural philosophers, seemed to be groping for a working theory of the problem of origins. Francis Bacon pointed out the evidence for variation and how this led to a gradation of life. However, he did not put forth a general theory of evolution. He did advocate research in order to collect facts. When facts had been collected, he thought they would automatically reveal truth to the investigator. However, he failed to recognize what is now known as the scientific method.

Facts will not automatically align themselves to tell the truth. They must be subjected to study. First, a problem must be set up and a hypothesis formulated. This is a scientific "guess" or answer to the problem. From a certain set of facts many hypotheses might be formulated. Then further tests must be made. If any hypothesis seems to hold up to the test, and can be made to cover a wide range of similar problems, it is then advanced to the status of a theory, which is an explanation that is reasonable. If a sequence of natural phenomena has been found to be invariable under similar conditions, then it is known as a law.

Rene Descartes differed from Bacon in his explanation of natural phenomena. He thought that the universe was a mechanism that operated under the laws with which it

was endowed. Those who took this view became known as Deists; they believed in a God, but a sort of "absentee God," who, having made the world, then left it to operate automatically, without intervening in its affairs. In taking this position Descartes broke with the prevailing beliefs in theology, which attributed all operations of nature to the direct intervention of God. He broke away from belief in special creation, and helped open the way for evolutionary views which some scientists were even then advocating.

Gottfried Wilhelm Leibnitz is celebrated as the developer of differential and integral calculus. He advocated a theory of the nature of matter that has generally been considered erratic, but which is surprisingly like the modern atomic theory. He said that the reality of all nature consisted of centers of force, which he called *monads*. There was a continuous series of monads from the lowest to the highest. The life of each monad is a thought life. When they reach a certain high state, they become souls, which are superior to ordinary material substance. Each monad acts according to the harmony with which God has endowed it. According to this theory, evolution is a necessary part of a system of cosmic philosophy. He directed research to the evolution of species. His idea that each soul or spirit was like a small divinity in its own right, by which it rests in fellowship with God, comes very near to a materialistic pantheism.

Immanuel Kant, who died in 1804, has been said to have given the fullest expression of evolution in his time. He taught the origin of organic forms out of raw matter by mechanical laws. There was a gradual development of different species of descent from a common ancestry. He also expressed the idea of survival of the fittest.

Comparative anatomy, he suggested, reveals a mechanism of nature, a blood relation. The whole animal kingdom, the family of creatures, is connected by a continuous and connected relationship.

While Descartes taught that the body is a mechanism,

others disputed the idea, and advocated vitalism. The body, they asserted, has a sensitive soul, like the *psyche* of Aristotle. This soul controls the chemical processes. It is different from other forces outside the organism. Vitalism and mechanism were hotly debated for many years, but eventually vitalism lost its prestige, and few rigid vitalists are found in our time.

The William James Lectures delivered at Harvard University in 1933 by Arthur C. Lovejoy throw much light on the philosophic backgrounds of modern evolution as well as of medieval theology. It has commonly been pointed out that evolution began with Buffon or Lamarck, or even with Darwin. But Lovejoy goes farther back and shows the antiquity of the evolutionary concept. The "Great Chain of Being," as he calls it, was, "until not much more than a century ago, probably the most widely familiar conception of the general *scheme* of things, of the constitutive pattern of the universe; and as such it necessarily predetermined current ideas on many other matters." (85:vii)

Lovejoy analyzes this philosophic concept and shows its influence on medieval philosophy and theology, and on modern philosophy, theology, and science. European philosophical tradition has been said by scholars to be merely a series of footnotes to Plato. We shall confine our remarks to the scientific aspects of the question.

Plato's philosophy had two aspects of God. One might be called the Absolute, or Ideal, in which the supreme "God," whoever or whatever He was, was self-sufficient, alien to human thought, and without interest in human experience. The other aspect might be called the Real, manifesting itself in generative power and in creating diversity in the world. Plato's concepts were developed by his brilliant pupil Aristotle, particularly the second one. But the Aristotelian concept of God had nothing in common with the Hebrew or the primitive Christian idea of God.

"Nothing is clearer, as Lovejoy has amply demon-

strated in his discussion of the subject in *The Great Chain of Being*, than that the concept of continuity scarcely ever, from Aristotle to Leibnitz, signified any sort of transformation of species. . . . So fundamentalist a believer in the Continuity Principle as Charles Bonnet . . . drew from it no notion of evolutionary transformation of one species into another." (62:39)

The Great Chain of Being was as much a key to the thought of the 18th century as the word *evolution* was to the 19th. Preformation, the idea that the present species received their characteristics from those implanted in the original creation—sometimes referred to as the theory of "emboitement"—and the theory of spontaneous generation were both taken as support for the doctrine of continuity. (85:184)

Eighteenth century thought was largely concerned with man's place and role in nature. In the field of biology Aristotle's idea of classification was the stimulus of developing systems of classification. The first great modern systematist, Cesalpino, accepted the concept of "natural species," which were fixed. Others rejected the idea. Buffon, in his *Histoire Naturelle*, attacked the systematists. Nature, he asserted, moved by gradations. It is possible to ascend by insensible degrees from simple to complex. There are many intermediates. This concept has been regarded by evolutionists as the beginning of their modern theory.

Buffon later abandoned the concept, but others carried it on. Among the outstanding advocates was Charles Bonnet, the Swiss naturalist. In his book on philosophy, in 1770, he "presented one of the most extraordinary speculative compounds to be found in the history of either science or philosophy—an interweaving . . . of geology, embryology, psychology, eschatology, and metaphysics into a general view of the history, past and to come, of our planet and the living things thereon. . . . Whether it can properly be called a form of 'evolution' is a question of terminology." (85:283)

Singer, in his *History of Biology*, gives a very clear statement of the influence of Bonnet:

"Bonnet was very influential on the Christian side. . . . He raised the doctrine of preformation . . . to the rank of a dogma . . . which . . . he . . . made to serve religious ends. Moreover, he stamped upon the comparative anatomy of his age a rigid interpretation of the Aristotelian ladder of nature. Passing from the most subtle of the elements, fire and air, through water and earth, to the minerals, it ascended through crystals to living things, proceeding via moulds, plants, insects, and worms to fish, birds, mammals, and finally to man. Man is the type by which other forms must be tested. 'All beings,' wrote one of Bonnet's followers, 'have been conceived and formed on one single plan, of which they are the endlessly graded variants. This prototype is man, whose stages of development are so many steps toward the highest form of being.'" (151:207)

The ideas of Bonnet constituted the orthodox "evolution" of the 18th century, but his ideas were similar to those of Aristotle. Development was from the germ upward. While Aristotle was not clear as to the origin of the germ, Bonnet taught that it was created, and from various created germs of life the present species arose, each developing "after his kind." This was much the same as taught by Augustine. Nineteenth century evolution differed in that it envisioned the origin of one species from another. (62:164)

Naturalists of his time talked about the "creative advance of nature." The birth of an animal, Leibnitz said, is only the transformation of an animal already alive, into another form.

The principle of continuity set biologists looking for the "missing links" between apes and men. Even Linnaeus was confused regarding the relation between man and the orangutan. Rousseau asserted in 1753 that man and the higher apes were the same species. From the middle of the 18th century to the time of Darwin the hunt

for missing links engaged the specialists as well as the general public.

More detail might be cited from Lovejoy's work, but these points are sufficient to show the truthfulness of the statement that when Darwin propounded his theory of evolution, it was as if the water that had been piling up behind a dam burst out with uncontrollable force. Darwin's ideas were not original with him, but he couched them in such language that men were convinced that he had found the secret they were seeking.

Chapter Six

The Golden Age of Creationism

IN THE face of the skeptical philosophical influences of the 17th and 18th centuries, creationism appeared to be losing ground. But a dramatic turn of events placed it in the forefront of scientific and religious thought. This was the Protestant Reformation, which began its work in the 16th century.

For many years before Martin Luther nailed his 95 theses to the door of the church at Wittenberg, unrest was growing within the Catholic Church, both among the laymen and the clergy. A rising protest was developing against the ritual, which some thought was actually pagan in its form; traditions had crept into the church, which seemed contrary to the spirit of primitive Christianity. Greek philosophy had introduced many interpretations of the natural world that were contrary to the Scriptures. Politics was corrupted, and morals were at a low ebb, even among the hierarchy. Many conscientious persons longed to see reforms in the whole church policy.

The Reformation was a "back to the Bible" movement. The main point at issue was the Word of God against the words of men. And as an essential part of the return to the literal reading of the Bible came an increased interest in the creation record of Genesis.

"The emphasis laid by the Protestant Reformers on

the verbal inspiration of the Bible led to a . . . literal interpretation, and by the eighteenth century an acceptance of the details of the story of organic creation, as given in the first chapter of Genesis, became necessary to orthodoxy. In the nineteenth it was apparently believed by almost the whole Christian world." (41:310)

"Surprisingly little is said about Creation in the Lutheran Confessions. No cosmogony on the basis of Genesis 1 and 2 is offered, although Luther . . . and others in commentaries treat the Genesis account as a plain historical account or history of what actually took place. . . . The matter of 6 days and their length . . . are . . . not even broached." (135:17, 21)

But it was not the Protestant Reformation alone that contributed to the strength of the creationist cause. Francisco Suarez, Spanish theologian and philosopher, who lived from 1548 to 1617, brought about a reformation in Catholic theology. He was one of the most voluminous writers of history, and most of his contributions have become a part of modern theology. According to the New Catholic Encyclopedia, his *Disputations metaphysicae* were the first systematic treatment of philosophy not based on the texts of Aristotle. And in an article in the Encyclopaedia Britannica, edition of 1966, we read that while he followed Aristotle and Aquinas, yet he criticized them and drew his own conclusions.

The Catholic Counter Reformation, of which Suarez was a part, had a powerful influence on the recognition of the authority of the Scriptures in faith and doctrine. This tended to minimize the Greek philosophical heritage of the medieval church and establish Catholic dogma more fully on the Bible.

God was recognized as the Creator and Sustainer of matter. This correlated with the Protestant doctrine of creation, and helped to maintain that doctrine during the 18th and 19th centuries in the face of the rising tide of uniformitarian evolution.

The theology of Suarez became the accepted teaching

of many Catholic and Protestant universities in the 17th century.

The three hundred years following the beginning of the Reformation have been called the "Golden Age of Creationism." Men were opening up the wonders of the physical universe, and probing into the secrets of plant and animal life. They made a large number of fundamental discoveries during this period, and learned enough of the universe to give a fairly adequate knowledge of the various fields of scientific interest. The foundations were laid for the correlation of science with Biblical revelation. Many crude notions were revised in the light of the new discoveries, and many problems opened up for further study. In all this progress most men retained a firm faith in God, and regarded natural phenomena as manifestations of His Power. The new discoveries served to strengthen and confirm their faith.

Probably the most perplexing question of this time, and one of the most important, was: What is a species? And related to it was another: How did species originate? These questions were brought into sharp focus by studies on the classification of plants and animals.

The first man to pay any serious attention to the problem was Matthias de l'Obel. He tried to classify plants by the shape of their leaves, but this proved impossible. His name remains in the familiar *Lobelia*. Then Andrea Cesalpino of Pisa tried to base a classification on flowers and fruits, but with no better success.

Gaspard Bauhin of Basel is generally considered the first man to recognize the basic principles of classification. In 1625, the year after his death, his treatise on classification was published. In it he described 6000 species of plants, and was the first to see the relation between *genus* and *species*.

What is a genus and what is a species? Even today no exact definition can be given, but a species is generally considered to be the smallest division, or end group, in classification, and consists of a group of plants or animals

having common characteristics, which will freely interbreed with one another, but generally will not breed with others outside the group. The genus is a group of closely related species, very much alike, but usually distinct as to breeding possibilities.

Plants and animals are given Latin genus and species names. This system is known as the binomial nomenclature. For example, the gray squirrel is called *Sciurus griseus*, *Sciurus* being the Latin name for squirrel, and *griseus* meaning gray. The genus is usually a noun and the species an adjective or possessive form of a noun. They are printed in italics.

John Ray of England played a large part in developing a system of classification. In 1667 he published a complete flora of the British Isles, as far as was then known. His *Historia generalis plantarum* (*General History of Plants*), published in three volumes from 1686 to 1704, gave the structure, physiology, distribution, and habits of all plants listed in previous lists, 18,600 species in all. Another monumental work, and one that shows the attitude of the scientists of his time, was entitled: *Wisdom of God Manifested in the Works of the Creation*, published in 1691.

In France, Joseph de Tournefort occupied the same position as did Ray in England, but his work was inferior. However, he was a great inspiration to Linnaeus.

Karl von Linné, to use his Swedish name, or Carolus Linnaeus, as we generally know him, is recognized as the one who firmly established the system of binomial nomenclature. In 1735 he published the first edition of his *Systema Naturae*, which went through twelve editions. The 10th edition in 1758 is generally taken as the starting point for the modern naming of plants and animals, although some claim that this is based on his *Species Plantarum* in 1753.

Linnaeus was trained as a physician, and practiced some, but his chief interest was classification, primarily in botany. He visited England and France, where he met

many botanists. In 1741 he was appointed professor of medicine at the Swedish university at Uppsala, but the next year transferred to the department of botany, where he remained for the rest of his life.

Linnaeus became one of the most outstanding men of his time, and his influence helped to maintain creationist views for a hundred years after the appearance of his works on species. In his early writings he made the following statement:

“There are just as many species as there were created in the beginning. There is no such thing as a new species.” (151:192)

This viewpoint became known as the doctrine of fixity of species. But before his death Linnaeus found it necessary to make some modifications in his understanding of the problem, as he found that some species had apparently been derived from others, and some groups of species appeared to have come from common ancestry. What he apparently did was to accept the Genesis record for what it purported to be—a record of original creation—and to recognize the changes from the original forms whenever he found them. He admitted what every field naturalist knows to be true, that there is a certain degree of modification in living forms, which must be recognized by evolutionists and creationists alike. But these changes are not the same as evolution. Throughout his life he maintained the idea that major kinds were created.

During the century following Linnaeus his ideas regarding the fixity of species held a dominant position in natural science, while at the same time a few scientific men were advocating more attention to gradations between species. Among these men was George Buffon of France. But the influence of Linnaeus was much greater than that of Buffon, and the evolutionary views advocated by Buffon were adopted slowly.

One of the greatest naturalists of the time was Georges Cuvier of France (1769-1832). As a child he had become

fascinated with Buffon's works, and he devoted his life to the comparative study of animals; in fact, he is said to have been the founder of comparative anatomy and paleontology. He was appointed Professor of Comparative Anatomy at the Museum of Natural History, and occupied a number of other scientific and political posts. He published many works on biology, and was generally recognized as the outstanding authority on that subject. He worked out detailed schemes of classification.

Cuvier contributed to the creationist cause by his debates with his colleague Geoffroy Saint Hilaire in 1830. The latter was one of the instructors in the Museum of Natural History, and he made many fine studies in that field, but he advocated certain theories of evolution which were fantastic in the extreme. With these Cuvier took exception, and in the discussions he so strongly opposed the evolutionary views that for the next 30 years little attention was paid to the theories being put forward.

Chapter Seven

The Older Diluvialism

BEFORE we go into the development of modern evolution, it will be well to go back and trace the rise of modern ideas of geology, for we need to know the part they played in the questions regarding species and their origin. For, if the earth has had a long geological history, then the problem of the species now on it will be regarded differently than if it is only a young earth. Whether we trace the origin of species back to creation a few thousand years ago, or to long ages of development, makes a vast difference as to how we understand the speciation problem.

It should always be kept in mind that men got their first ideas of diluvialism (Flood action) from the Genesis record or from legends similar to that record. The earlier views cannot be expected to show much scientific validity, nevertheless they are worthy of inclusion in this study. As early as the beginning of the Christian era we find references to the geological work of the Flood. Philo of Alexandria tried to portray the action of the waters upon the earth, but whether he wrote from pure conjecture or from legends, we have no way of knowing.

Tertullian, at the beginning of the 2d century A.D., and Chrysostom and Augustine in the 5th century, discussed the cataclysmic action of the Flood. But we must

remember that there was no such science as geology in their day.

Martin Luther, in his *Commentary on Genesis*, attempted to portray the awful work of the Flood.

The first man to present anything like a scientific treatise on diluvialism was Nicolaus Steno, who in 1669 published his views regarding Flood action. He recognized the principle of stratigraphic sequence, and the fact that the strata were once all horizontal, but have since been upheaved and distorted. He was one of the first to interpret fossils as remnants of ancient life.

Another of the early advocates of the Flood was Thomas Burnet. In *A Sacred Theory of the Earth* (15) in 1681 he argued that the waters of the earth had percolated up through the crust of the earth from the abyss below, and the shell of the earth had cracked, permitting these waters to overflow the land.

John Woodward was perhaps the most influential of the early believers in the Flood. His *Essay toward a Natural Theory of the Earth* (169), in 1695, exerted a profound influence on the thought of the following century, and many of his suggestions are still accepted by some diluvialists. We might note a few of his ideas:

1. All the rocks and minerals of the earth were totally dissolved into their "constituent corpuscles."

2. All this mixture, together with plant and animal remains, were mingled together in one confused mass.

3. This mass precipitated, according to the laws of gravity, forming the strata of the earth.

4. The bodies of men and animals, being exposed to the air, disintegrated and left their scattered remains on the surface.

5. The irregularities of the earth's surface were formed by the elevation and sinking of the originally flat strata.

Woodward was largely responsible for convincing the world that the fossils were remnants of former life. Before his time they were regarded as freaks of nature. Some thought they were the result of fermentation, or of the

action of seeds or spores that had sunk down into the earth. Some said that God had placed them in the earth to test men's faith; others declared that the devil had put them there to deceive men. Still others thought seeds of life had blown in from the sea, some said they were merely concretions with only an accidental resemblance to living creatures:

Alexander Catcott, in his *Treatise on the Deluge* (17), in 1768, repeated Woodward's idea almost word for word, and added the idea that the mountains and valleys were produced by erosion of the originally continuous strata. Part of this erosion was the result of the Flood and part of it due to action in the following centuries.

Not only did the 18th century churchmen believe in the creation story of Genesis, but, as a general rule, they accepted the record of the Flood, although many interpretations were being offered for the stratified rocks.

John Wesley suggested that some unusual event, such as a comet, raised a tide that produced the Flood. The fountains of the great deep, spoken of in Genesis, were interpreted by him as caverns in the earth from which waters issued to unite with those coming down from above.

The thought of the 18th century revolved largely around the ideas of Woodward, that the strata of the earth were formed by the Noachian Deluge. But toward the end of that period increasing geological knowledge brought in a different interpretation. There arose what has been called *classic catastrophism*, or the older *diluvialism* (or *diluvianism*, if one prefers). The chief advocate of this doctrine was Baron Cuvier.

Cuvier's influence was peculiar; while refusing to accept the growing ideas of organic evolution, he set up an interpretation of geology that tended to destroy faith in the literal record of the Flood.

The phenomenon of successive or cyclic deposition may be observed in the London and Paris basins, with not less than six series of marine sediments alternating with

terrestrial deposits. Cuvier concluded that the earth had been through a series of catastrophes. In each of these the land life was obliterated, and the waters had brought in marine life and laid it down in layers between the land deposits.

This new viewpoint, which was destined to become dominant in geological thought for much of the early 19th century, was invoked to explain the Noachian Deluge as only one of several catastrophes that had overtaken the earth during its long history. Many geologists followed Cuvier's lead and looked to these catastrophes as the source of the major geological deposits. Adam Sedgwick, for many years the leading figure in British geology, spoke of coal-forming vegetation being swept into the sea in immense abundance, spread out, and mixed with sand, mud, and sea life.

Modern creationists can accept this idea in part, but it must be noted that Sedgwick followed Cuvier in saying that the Flood of Noah's time was not responsible for all the catastrophic evidence. Note these words:

"We ought, indeed, to have paused before we first adopted the diluvian theory, and referred all our old superficial gravel to the action of the Mosaic flood. . . .

"What has happened, again and again . . . in the history of the earth, may have happened during the few thousand years that man has been living on its surface." (144:I:281-316)

A strange mixture of diluvialism with the idea of long geological ages may be seen in the statements made by Benjamin Silliman, head of the geology department of Yale University. In his *Geological Lectures*, in 1829, he spoke of whales, sharks, crocodiles, mammoths, rhinoceroses, hippopotamuses, tigers, deer, horses, and other animals buried in diluvium, or superficial gravels. These remains he ascribed to the Noachian Flood, but he interpreted the deeper sediments as the result of former deluges. He said:

"It is now proved, beyond all reasonable doubt, that

the various fossils imbedded in the regular strata of the earth, could not have been lodged there by the deluge. . . . We must, therefore, look for proofs of the Noachian deluge in those deposits of loam and gravel, confusedly mingled together, and spread over every country on the globe. . . . It is in this diluvium, that the principal geological evidences of the deluge occur.” (150)

This statement by Silliman shows a changing attitude toward the Deluge. The solid strata of the earth he did not consider to have been formed by it, but only the loose, scattered sediments. This attitude continued to gain weight as geological study developed during the 19th century until there was almost nothing left to be ascribed to the Flood.

In 1823 William Buckland wrote *Reliquiae Deluvianae* (Relics of the Deluge) (12), which dealt largely with fossils found in caves. He claimed that these fossils were washed into these caves by the Deluge.

Largely under his influence, diluvial geology succeeded in winning, for a time at least, almost unanimous assent both as to assumption and conclusion. Even Lyell paid tribute to Buckland by dedicating the 1830 edition of his *Principles of Geology* to him. (60:111)

About this time H. H. Hayden published his *Geological Essays*, which described the scattered sediments of Eastern America, attributing them to the Deluge. (67) Silliman objected to this, saying that he did not think that the Noachian Deluge could have produced them. He spoke of “the more recent periods of the prevalence of the great chaotic deluge, whose existence is distinctly recorded in the first chapter of Genesis, and equally admitted by all geologists.” (149)

Silliman confused the Biblical record of the Flood with the creation record in the first chapter of Genesis, where the statement is made that the earth was without form, and void. Yet the Flood theory was not dead, for even in the face of these tendencies to regard it as only one of many catastrophic actions, a number of works were

published supporting the Flood.

In 1833 James Parkinson published a lengthy discussion of the formation of coal and petroleum, attributing them to the action of the Flood. His views on the formation of coal were almost the same as those expressed by the British geologist John Williams in 1789. Then William Kirby, president of the Royal Society in London, in a treatise in 1835, gave an excellent discussion of the probable actions of the Flood. He regarded the first period of the Flood as that in which most of the animals perished, and the last one as that in which new strata were being formed. He also questioned the common idea that animals were buried where they lived, but rather supposed that they had been drifted far from their original habitats. Two years later George Fairholme, a geographer, discussed at some length the various phenomena of the stratified rocks and their contents, which he strongly argued were evidences of the Noachian Deluge.

Other writers continued to advocate the Flood as the cause of the stratified rocks of the earth, well into the later years of the 19th century, even though popular geological investigation was turning against the idea.

The last "Deluge geologist" of the 19th century was Henry H. Howorth, president of the Archaeological Institute, and writer of over 100 scientific, historical, and ethnological works. He was one of the most outstanding critics of the glacial theory, and wrote three large treatises on the subject. (74, 73, 72) However, he can hardly be called a true diluvialist in the sense that he believed in the Bible record of the Flood, for he did not. He took his clue for the reality of a great catastrophe from traditions, not from the Bible. In fact, he ridiculed the creation story and the Flood record as unworthy of consideration. He did, nevertheless, bring together a mass of detail against the uniformitarian hypothesis. Some of his material is questionable, for it seems to have been derived from reports of travelers, many of whom were neither scientists nor always reliable in their observations or cautious in their

descriptions. Some obvious errors have been perpetuated, by being copies from his writings and passed along from one to another, until today there are many confused ideas about the mammoths and the glacial phenomena.

Howorth argued that there was no Ark, but that certain areas of the earth were untouched by the Flood, thus serving as a refuge for animals, which later migrated outward and repopulated the devastated areas.

He reported that since 900 A.D. mammoth tusks had been collected from Siberia and shipped to China and other parts of the world. In 20 years 20,000 tusks, he said, were taken from one "mine." He cites reports of explorers feeding the flesh of the frozen mammoths to their dogs, and even eating it themselves. Such reports have been denied, and must be regarded with a certain amount of reserve.

In most of his discussions two phenomena seem to be confused—the masses of bones on the Arctic islands and the frozen carcasses of mammoths found along the banks of the Siberian rivers. The assumption was made that the same catastrophe produced both. However, more recent investigations seem to indicate that the two phenomena are unrelated. The burial of the bodies that have been found frozen are now believed to have dated from a much later date than the masses of bones on the islands along the Arctic shores.

Howorth did, nevertheless, give pertinent data against uniformitarianism in the fact that in other areas, such as in Italy, France, and parts of America, great masses of bones have been found. The reason why they are so much better preserved in the Arctic is because of the cold prevailing there.

Many other writers have discussed the problem of the Flood vs natural burial of plants and animals, and if the reader is interested he should read Byron Nelson's *The Deluge Story in Stone*. (See Reference 114, for details.)

In summarizing the situation we can now see that in

the early days of the scientific awakening, it was generally considered that the stratification and distribution of the rocks of the earth were produced by the violent action of the Genesis Flood. This idea prevailed until the time of Cuvier, although some were trying to introduce opposing explanations, as we shall see in the next chapter. Cuvier's catastrophism changed the attitude of both scientists and theologians toward the Flood, by reducing it to merely one of many catastrophes. But in spite of this, works continued to be written defending diluvialism against the rising tide of uniformitarian geology. Howorth's work was the last of the 19th century studies opposing popular views. It was not written to defend the Biblical record but to show that tradition and legends of the Flood had strong correlation with the data from geology, even though he regarded the Genesis story as only one more legend.

Chapter Eight

Geologists Challenge Creationism

AT THE close of the Middle Ages, when men began to realize that fossils were the remains of life of the past, the Deluge record of Genesis was sufficient to satisfy their interest in the origin of the fossiliferous rocks. The first man to propound ideas like those popularly held today was Nicolaus Steno, or Steensen. In his *Dissertation*, in 1669, he laid the foundation for modern stratigraphy and paleontology. He observed the relation between living and fossil shells. The *Dissertation* was translated into English, but was not favorably received, as the idea still prevailed there that the fossils were *vis plastica*, or concretions of mineral matter. English ideas of the Deluge were crude and unscientific, largely founded on imagination.

Several French and German scholars played a part in developing the idea of uniformitarianism. Rene Descartes ascribed the origin of the earth and the other planets to the cooling of an incandescent mass. Leibnitz enlarged and systematized the ideas of Descartes. He believed in the molten interior of the earth, and taught that present forces were sufficient, if given time enough, to accomplish all geological changes. He taught that the fossils were indications of these past changes.

George Buffon accepted the ideas of Descartes and

Leibnitz. In 1779 he drew up a chronology of the earth, dividing geological time into six periods of unequal length. In 1788 he completed his *Histoire Naturelle* of 36 volumes, but scientifically it was of little value. His ideas of earth science were mere copies of Descartes and Leibnitz. Yet he is often called the father of modern geology, because of the fame his natural history gave him.

The first attempt to divide the rocks and establish a geological chronology was made by Giovanni Arduinno in 1759. He studied the southern Alps and the plains of Italy, and set up four divisions of the crust of the earth: (1) *Primary*, the crystalline rocks without any fossils, (2) *Secondary*, the fossiliferous limestone flanks of the mountains, (3) *Tertiary*, the gravels, sands and marls which were the unconsolidated sediments of the plains, and (4) *Quaternary*, the glacial, fluvial, and lake deposits covering much of Europe, and thought to be remnants of the Biblical Flood.

This system was applied to other parts of Europe until after 1800, when further investigation made revisions necessary. The terms Tertiary and Quaternary still persist, but other terms have been applied to the first two subdivisions, and they have been considerably modified.

J. C. Lehman, who in 1761 was appointed as Director of the Imperial Museum in St. Petersburg, followed much the same plan as did Arduinno. A. G. Werner, Professor of Mineralogy at Freiberg, Germany, believed that the rocks were precipitated in order uniformly all over the globe. This theory has been called the "onion-coat" theory.

The man who is generally credited more than anyone else with modern concepts of geology was James Hutton. He was born in Edinburgh and received his medical education in Leyden. Upon returning to his home country he became interested in agriculture, and did much to improve it in Britain. In 1795 he read a paper before the Royal Society of Edinburgh, entitled *A Theory of the Earth*. His views were of more scientific validity

than those of his predecessors. However, in attempting to explain the present state of the rocks, he took the views of the Greeks, that all natural processes must have required indefinite time. Discussing the various cycles of geological action, he said:

"The result, therefore, of our present inquiry is, that we find no vestige of a beginning—no prospect of an end."—*A Theory of the Earth*, p. 304.

Hutton's paper was so difficult to understand that it received little public attention until John Playfair, in 1802, published an *Illustration* of it. In this he said that while the Bible was concerned with the human race and its history on the earth, there is no good reason why geological action may not have been much more ancient than man himself. Thus he swept away all scientific credence for the Flood as one universal catastrophe and opened the way for acceptance of long ages of geologic time. The influence of his discussion was to turn geologists in the direction of uniformitarianism.

Because of Cuvier's catastrophism, scholars were slow to accept Hutton's uniformitarianism, and it was a generation before his views were generally recognized. When they were, it was largely due to the work of Charles Lyell, whose *Principles of Geology*, published in 1830, ran through twelve editions and was used as a textbook in Europe and America for fifty years. It brought together data from all over the earth, with the express purpose of showing that all past changes have been of the same nature as those now going on. He traveled widely and made extensive observations, which he incorporated into the different editions of his book.

Adam Sedgwick, Professor of Geology at Cambridge, strongly opposed Lyell's views, but eventually "apostatized," as Gillispie says. (60:142) In an uncompromising speech upon his retirement from the presidency of the Geological Society, he remarked:

"Having been myself a believer, and, to the best of my power, a propagator of what I now regard as philosophy

heresy . . . I think it right, as one of my last acts before I quit this Chair, thus publicly to read my recantation.

"We ought, indeed, to have paused before we first adopted the diluvian theory, and referred all our superficial gravel to the action of the Mosaic Flood. For of man, and the works of his hands, we have not found a single trace among the remnants of a former world entombed in these deposits." (144)

Sedgwick did not abandon the idea of sudden and universal catastrophes, but he placed them before the advent of man upon the earth, and could not believe that the Mosaic Flood was universal.

Still the geologists were faced with one difficult problem, that of relating one rock to another in sequence. So far no satisfactory system had been devised. This was to be initiated by the work of a man who was in no sense a geologist.

William Smith was a canal engineer, land agent, and surveyor. During his professional life he observed that certain layers of rock always occurred in certain relationships, and usually contained certain types of fossils. In 1815 he constructed a geological map of England, which would do credit to any map maker. This map, which now hangs in the Royal Museum in Toronto, Canada, shows the different geological formations in color, with cross sections of the country to show their relative positions. Many of the names assigned to the formations by Smith are still used. Because of his work he is often called the "Father of British Geology."

His observations soon attracted the attention of the geologists. The British Geological Survey had been founded in 1807, to investigate and gather geological data. Many prominent British scientists were members, and in the half century following its founding, rapid strides were made in geological investigation.

It has sometimes been said that the geologists of Smith's day were trying to overthrow faith in creation. But Smith himself said that the boundless extent of

creation was witnessed by the numberless fossils to be found in the rocks. He made no attempt to interpret the time sequence of the fossils, but simply presented his findings as a practical method for identifying the formations. If others wished to attach time values to them, that was their concern, not his.

We should recall here, as we have already mentioned, that while most scientists at this time were professing faith in the Bible record of the Flood, many still held to the theory that most of the rocks were laid down in long ages of time before the Genesis record. And so, assuming this to be true, they saw in Smith's discovery a method whereby they could correlate the geological formations and arrange a time sequence for the rocks.

As geologists in different parts of the world began to make extensive studies, revisions were made in Arduinno's classification, and the whole problem began to take on modern aspects.

In England outcrops of coal seams, which were called the Coal Measures, were very important in the rapidly expanding industrial development. In 1822 these were renamed the Carboniferous System. Lying above the coal was a mass of red sandstone, known as the New Red Sandstone, to distinguish it from a similar mass of red rocks lying below the coal beds. In Germany it was noted that these red beds were three-fold in nature, and were called Triassic. The Jurassic rocks were so named because of their prevalence in the Jura Mountains. And in England the chalk cliffs that were found to overlay the Triassic and Jurassic formations, were named Cretaceous, from the Latin *creta*, chalk.

But there was one mass of rocks that no one had been able to decipher. These lay below the Carboniferous. In 1822 Adam Sedgwick began studies on these rocks in southwestern England. In 1831 he extended his studies into Wales. About the same time Roderick Murchison, of the Geological Survey, carried on extensive work on these same rocks. The two men violently disagreed as to how

the strata should be interpreted, but finally a compromise was reached, and several new systems were set up. The lowest was called Cambrian, the next the Ordovician, then the Silurian, all named for Welsh tribes. The Old Red Sandstone, between these rocks and the Carboniferous, was renamed Devonian, because of its prevalence in Devonshire.

Murchison described in great detail the rocks lying directly above the Carboniferous. Because of this, the Czar of Russia invited him to study the rocks in the province of Perm, on the western flank of the Urals. These rocks were found to be equivalent to those in England lying above the Carboniferous, and the Permian System was established to include them.

While the European systems were being set up, studies were carried out on the rocks of New York, beginning in 1836 and running for five years. These rocks included everything from the Cambrian up to the Carboniferous. In 1891, the lower part of the American Carboniferous was separated to become the Mississippian, while the upper part was named Pennsylvanian. The British do not recognize this division in their rocks. The Permian was not recognized in America for some time, but is now known to be extensive in the southwest.

Studies on the upper rocks first began in the Paris Basin. Charles Lyell set up three divisions of the Tertiary, based on the percentage of living shelled invertebrates found in them. These were Eocene (dawn-recent), Miocene (less-recent), and Pliocene (more recent). Other divisions were added later.

The loose, scattered sediments lying on top of the others were generally supposed to have been formed by the Flood. But studies by the Swiss scholar Louis Agassiz, Professor of Natural History at Neuchatel, changed the whole picture. In 1836 he began noting the movements of glaciers in his native Alps. He observed boulders that differed from the rocks on which they were found lying. He carried his studies all over Northern

Europe and eventually to North America. In his *Etudes sur les glaciers*, published in 1840, he showed that the loose debris formerly attributed to the Flood actually was produced by ice movements.

In North America, glaciers had covered much of the northeastern portion, north of a line running from Long Island in New York west to the Ohio River, then down to its confluence with the Mississippi, then along the Missouri River into the Dakotas and then west to the Rockies. Extensive glaciation took place also in the higher mountains of Western North America.

The glacial theory proposed by Agassiz was quickly accepted. This left nothing to be credited to the Flood, except the deposits of clay and sand in the valleys. Since all the lower sediments had been considered the result of millions of years of natural deposit, the Flood theory of geology was given a deathblow. Although some writers continued to advocate it in the face of the popular views, it eventually faded out before the end of the century.

The general outlines of modern geological theory were now completed, and only a comparatively few changes were made after the middle of the century. Studies all over the world recorded geological data, until by the beginning of the 20th century world geology was fairly well known. Since then a vast amount of exploration has been made, especially in the field of oil geology.

What, now, is the challenge that modern geologists offer to creationism? Not that its workers were, or are, necessarily anti-Christian. Many see in the tremendous expanse of geologic time evidence of the power and wisdom of the Creator. But by placing their own interpretation on the geological data rather than following the record given in Genesis, they have eventually abandoned the Bible story of a literal creation and a world-wide catastrophe. As far as the scientific world is concerned, the Genesis record is only a myth or a folk tale.

Chapter Nine

The Battle Over Darwin

DURING the century following Linnaeus his ideas regarding fixity of species were dominant in the natural sciences. At the same time suggestions of a gradation between species were being advanced and defended by a few scientists. The most prominent of these was Buffon. In 1755 he wrote: "Although the different species of animals are separated from one another by a space which Nature cannot overcome—yet some of them approach so nearly to one another in so many respects that there is only room left for getting in a line of separation between them." (14:V:59)

Buffon said that variation was caused by the influence of food and climate. He confused two categories of characters, one set "ineffaceable and eternally permanent," and the other variable. He suggested evolution, even though in some of his writings he favored creation. He seemed to be groping for a solution of the problem of origins. But his writings do appear to have influenced scientific men in favor of evolution rather than creation. He is plainly one of the first naturalists to recognize changes in species in contrast with the Linnaean views.

Erasmus Darwin, the grandfather of Charles Darwin, in 1794 published a book, *Zoonomia*. This ran into three editions, and was translated into French, German, and

Italian. In it he suggested that all warm-blooded animals have arisen from one living "filament," with the power to acquire new parts, new properties, and thus improve endlessly. But his suggestions did not receive much serious attention from the scientists.

The first complete theory of organic evolution is generally credited to Jean Baptiste de Lamarck. Because of injuries received in the army, he retired, and went to Paris to study medicine. There he became interested in botany, and in 1778 published a *Flora of France*. For the next fifteen years he spent his time largely in the study of plants, while acting as keeper of the herbarium at the *Jardin du Roi* in Paris.

In 1793 the French Revolution made profound changes in the "Garden," and its name was changed to *Jardin des Plantes*, a name suggested by Lamarck himself. He was transferred to the department of zoology. The field of invertebrate zoology was almost unknown at the time, and he made many important contributions. His remarkable genius is shown by the changes he made in classification during the next eight years. In 1802 he invented the term *biology* to cover both botany and zoology.

As soon as he entered into the study of the invertebrates, he began to publish his views regarding the origin of species. In the preface to his *Systeme des Animaux Vertebres*, in 1802, he indicated that he believed in a Creator who had fashioned only the simplest organisms, and "then with the aid of much time and favorable circumstances . . . formed all the others." This idea was much like that of Plato, who supposed that God created a plan and then left it to lesser gods to complete.

In 1809 he devoted much of his *Philosophie Zoologique* to his evolutionary theories. He emphasized two main points, (1) the effect of use and disuse, and (2) the inheritance of acquired characters. He also stressed the action of the environment, the balance of nature, the struggle for existence, the survival of the fittest, and

isolation. He mentioned almost every point that Darwin later used in developing his famous theory of evolution.

However much modern biologists may criticize Lamarck, he must be given credit for having recognized two points that are now generally accepted: (1) that species vary under the influence of environment, and (2) that a fundamental unity of plan underlies all diversity of species. But to recognize these points is not by any means proof for evolution of species.

His proposal for the inheritance of acquired characters has been the greatest point against which criticism has been leveled. But it is a peculiar fact that this was not particularly challenged until after Darwin became the dominant influence in evolutionary thinking. In fact, contemporary thought prevented the scientific world from paying much attention to Lamarck's theories, and it was only when Darwin's views made those of Lamarck a subject for dispute that they were given much attention.

One of Lamarck's theories that now is unacceptable was that of "use and disuse." He said that the changes in the environment would cause changes in some of the organs of an animal, and when these organs were exercised they would undergo special development. For example, a deerlike animal feeding on the leaves of trees might reach upward if available food were scarce lower down. This continual reaching up would cause the neck to elongate. Thus he explained the origin of such creatures as the giraffe.

We wonder, however, why others besides giraffes did not follow the same pattern. And what about burrowing animals? Why did not more animals burrow into the ground for safety? Many more such questions might be asked to challenge Lamarck's theories.

One book that was destined to play a large part in the acceptance of evolution was the *Vestiges of Creation*, or the *Natural History of Creation*, an anonymous work published in 1844. It was not until after the death of Robert Chambers, the publisher of the Encyclopedia and

other works, that it was known that he was the author. The *Vestiges* became very popular. Its principal theme was a presentation of the facts about geology as then known, and the supposed line of ascent from the lower invertebrates up to the higher animals. It taught that the simpler forms naturally developed into higher ones, until finally mankind was produced. It was a clear and forceful presentation of the concept of evolution, although it used the term creation. While its geological discussions were in line with the current knowledge, it advocated the development of man from the lower animals. This was so far from the thinking of the day that leading scientists rejected it.

In spite of scientific opposition, certain ideas in the *Vestiges* were of tremendous influence. By 1860 the book had run through eleven editions, with a sale of 25,000 copies, a tremendous circulation for that time. There is no doubt but what it did much to prepare the public mind for the reception of Darwin's *Origin of Species* when it appeared in 1859.

Another work that did much to promote thinking along evolutionary lines was the *Essay on Population* published by T. R. Malthus in 1798. In this book Malthus laid down the principle that populations increase in geometrical ratio, whereas food supply increases only in arithmetical ratio. Thus some means is necessary to keep populations under control. Darwin read the book in 1838. Alfred Russel Wallace read it also, and from it both men gained the idea of the struggle for existence and the survival of the fittest, two very important concepts in development of evolutionary theory.

During the half century between the publication of Lamarck's *Philosophie Zoologique* and Darwin's *Origin of Species* the development of geological theory brought about an inconsistency with the literal creation record of Genesis, and scientists were looking for some way of harmonizing the idea of long ages with changes in species. But the defeat of Saint-Hilaire, whose ideas coin-

cided with those of Lamarck, by Cuvier in 1830, left the evolutionary views in the background. It was nearly the middle of the century before Cuvier's catastrophism was thoroughly displaced by the growing theory of geological ages. Louis T. More has said in his book, *The Dogma of Evolution*, that the situation was like water piling up behind a dam. When Darwin proposed what appeared to be a plausible explanation for the origin of species, all the pent-up force behind the dam burst forth and overwhelmed the world. But let us see what part Darwin had in this movement.

Charles Darwin was the son and grandson of medical men, but after two years in medical school he found that he had no interest in medicine. He was sent to Cambridge to train for the ministry, but found that an awakening interest in science drew him toward collecting and theorizing on natural history. His professor of botany encouraged him to take up the study of geology, and he became associated with Professor Sedgwick in field studies. When offered a position as naturalist on *HMS Beagle*, which was to make a scientific expedition around the world, he accepted, but without any great enthusiasm.

While on this voyage he made observations on the distribution of plants and animals that were destined to change the whole trend of interpretation. In divinity school he had been taught that species are immutable, but when he wandered over the plains of Patagonia he began to see life types particularly suited to that barren area. He reasoned that they could not have been created that way, and suddenly the idea came to him that species did change, and were adaptable to the environment. He later confessed to a friend that it was like committing a murder. Then what he saw in the Galapagos Islands west of Ecuador convinced him that evolution had taken place.

These islands consist of ten main islands with a number of smaller ones. Darwin noted that most of the species of terrestrial life were native to the islands, although they resembled those of the mainland 500-700

miles away. But on the different islands of the group were forms different enough to be considered as separate species. Especially interesting were the finches, now known as Darwin's finches. He found thirteen species, with different groups on each island. The beaks were suited to varying types of food, from small slender beaks for catching insects to broad, heavy beaks for cracking seeds.

Why, he asked, should each island have its own peculiar group of plants and animals, and why should they resemble those of the coast of South America?

Darwin's *Origin of Species* was readily accepted because to many minds it removed the objections to the theory of uniformity as propounded by Hutton and Lyell. For two centuries the idea had been growing that the earth is very old. The Hutton-Lyell uniformitarianism reinforced that idea. But one obstacle stood in the way of full acceptance of evolution—how to account for the origin of species during long ages of geological time. Darwin's theory of natural selection appeared to have solved the problem.

Evolution rapidly took on the form of a monolithic structure, embracing all aspects of life. Theologians lauded it as an evidence of the wisdom of God in bringing order out of the original chaos. Educators used it as a basis for their "advanced" theories of mental training. Politicians hailed it as the verification of their dreams of progress. Industrialists saw in it an excuse for their deadening monopolies.

The common people who still clung to their traditional belief in creation were regarded as ignorant and reactionary. Religionists who refused to modify their dogmas to fit the new philosophy were accused of rendering homage to mere myths. All in all, it became the popular thing to believe, whether or not one could find solid evidence.

When the theory of natural selection was thrown open for discussion at the meeting of the British Association for the Advancement of Science on June 28, 1860, it was

plain to be seen that a theological rather than a scientific debate was to take place. Bishop Wilberforce and several others of the clergy with scientific standing were on the platform. The debate was a complete victory for the Darwinians. Wilberforce could only resort to ridicule, directing his principal argument against the idea of the ape ancestry of man. Thomas Huxley answered the argument with cool logic, and the data from the *Origin* were impossible to controvert, for Darwin's opponents had not taken the pains to prepare counterarguments. Church authorities held out for a while, but it was not many years before most of them capitulated.

Although vigorously opposing Darwin, church leaders were strangely at a loss for effective weapons with which to counter his theories. By the middle of the 19th century the growth of geological knowledge had forced many theologians to revamp their ideas regarding creation, and when Darwin came out with his evolutionary ideas, the clergy was very much at sea as to what interpretation to put on Genesis. They had no consistent line of argument, and could not present a united front against what they felt to be a subversive turn of affairs. They had already accepted all the aspects of the mechanistic interpretation, and by introducing critical scholarship into their theology, had adopted the scientific method of dealing with theological questions, rather than following the dogmatic method of settling disputed points by reference to the authority of the Bible. Being on the same ground as the scientists, they found themselves out-manuevered and unable to meet the scientifically organized arguments of the evolutionists. And so it came about that by the end of the century the success of the theory of evolution seemed to be complete and Bible creationism a dead issue.

During the latter part of the century evolutionists had modified all of man's conceptions of human society. All political institutions were regarded as having resulted from the environment, and therefore must be fitted to the

evolutionary development of that environment.

"The great dividing line in this realm of thought [materialism *vs* idealism], especially in Germany, was the work of Darwin. . . . German philosophers . . . developed Darwin's teaching into a philosophic creed. . . . Thenceforward in all countries such controversies ranged themselves round the concept of evolution." (41:306)

In Germany the doctrine of the struggle for existence led to the idea of a super-race, and had a strong influence in bringing about the wars of 1866, 1870, 1914, and 1939. Science came into close relation to everyday life, and in France and Germany the rising sciences swelled the tide of materialism.

But Darwin was not universally accepted. Among the scientific opponents was Richard Owen, the leading comparative anatomist of his day, and Louis Agassiz of Harvard, one of the outstanding naturalists of the 19th century. "Both were still bemused by Naturphilosophie." (151:304) Adam Sedgwick, Geologist of Cambridge, refused to acknowledge the new approach to the problem of species.

In Germany the leading opponent was Rudolf von Kolliker, the famous Swiss embryologist. He pointed out certain weaknesses in Darwin's theory, as, for instance, that there was no experimental work to demonstrate the formation of a species, that the variations within a species are not more sterile than the originals, and that intermediate types were extremely rare.

In France the reception of Darwin was on the whole hostile. Cuvier still remained the dominant figure in French science, and scholars like Bernard gave evolution a cold reception. Although evolution was eventually generally accepted, the change was slow. Many Frenchmen turned toward the *transformisme* of Lamarck. The botanist Nageli, while sympathetic as a whole toward evolutionary ideas, offered many suggestions for the modification of Darwin's views.

Finally it remained for a contemporary of Darwin,

Gregor Mendel, to discover the secret of heredity, of which Darwin was totally ignorant. While not known until 1900, the work of Mendel was destined to cause a radical revision of Darwinism, to be known as Neo-Darwinism. Mendelism, when worked out in detail by Thomas Hunt Morgan and many others, opened up a line of study that made such a change in the knowledge of speciation that Darwin, could he sit in on a 20th century discussion of the subject, would find himself almost, if not entirely, lost in the maze of new ideas. (151:303ff)

While many of Darwin's generation followed him blindly, by the last decade of the century the reaction against him reached impressive proportions. Among the most prominent opponents of Darwinism was William Bateson, who collected extensive data on variation. His investigations led him to emphasize discontinuity instead of gradation in nature. His work was supplemented by that of the Amsterdam professor Hugo de Vries, who proposed the theory that nature had proceeded by leaps, or mutations, instead of by gradual variations as Darwin had proposed.

Chapter Ten

Creationist Detours

NOW that our study has brought us up to the beginning of the 20th century, it is time to take a look at some problems that creationists have faced in the past two hundred years, and still do to a certain extent. Perhaps then we can understand better the vital issues that have resulted from the general acceptance of evolution. Perhaps we can better realize the significance of evolution *vs* creation in the realm of science and religion.

As modern scientists began their search into the operations of the natural world, they were faced with the question as to how to interpret what was found there. Should they accept the Bible viewpoint of a perfect creation which had been marred by sin and death, or should they interpret the natural processes in terms of upward progress—evolution? Scientists and religionists have followed many bypaths and taken many detours in the past few centuries.

Modern science began with a group of brilliant men, and in a truly inductive manner. Copernicus laid the foundations of modern astronomy by his theory that the earth revolves around the sun. Data to support this view were soon supplied by the great observer Tycho Brahe, and his efforts were supplemented by his successor Kepler, who formulated the laws of planetary motion.

Galileo added many facts to the store of accumulated astronomical knowledge. In the very year that he died, Isaac Newton was born. His *Principia*, published in 1687, brought together all the work of his brilliant predecessors. The new astronomy was placed on a solid basis by Newton's discovery of the law of gravitation.

The discoveries of Newton are recognized as among the greatest ever made. He and the other great men of his time verified their theories by mathematical deduction and observed facts. They tried to leave nothing to vain speculation. Not only did they hold to valid scientific methods, but they recognized their limitations, and in humility accepted God as Sovereign of the universe, while they tried to understand the manner in which He works.

The century following the death of Newton saw the entrance of speculative methods of science study. During the latter part of the 18th century the ablest men in France and Germany and England were skeptical in matters of religion. Naturalism became popular in the scientific world, and attempts were made to establish some universal philosophic explanation of all the phenomena of natural history. Men turned away from the Bible account of creation, and gave attention to philosophy.

The early part of the 19th century was, as far as the common people were concerned, a theological age in England and America. Religious beliefs were sharply defined, and had changed little since the Reformation. The authority of the Bible was unquestioned; it was inspired from Genesis to Revelation. Faith in a personal God was strong.

But naturalism on the continent of Europe gained in influence, although held in check by the "Great Awakening." The years from 1800 to 1845 constituted a period of religious fervor culminating in the Advent Movement begun by William Miller in 1831, foretelling the literal return of Christ to the earth. In 1844 the number of persons who confidently expected to see the end of the

world is estimated from 100,000 up to a million.

On the other hand, the religious life of Europe and America was deeply affected by liberalism and rationalism that started with Descartes at the beginning of the 17th century. He taught that truth was inherent in the mind of man, and could be reached by processes of reason. While he admitted the existence of God, yet he could not solve the problem of how God could influence a material world. The monadism of Spinoza pretended to solve the problem, since everything is part of God. Human reason is a part of the divine intellect, he said. Berkeley went as far as to say that there is no such thing as unthinking matter, no material substance; all is God.

Locke claimed that all knowledge comes from experience, and disagreed with some of the others on inherent ideas. In the realm of ethics he declared that whatever gives pleasure is good, whatever gives pain is evil. However, he did say that moral laws are established by God.

What was the result of all this confusion between philosophy and morals? In England it resulted in an 18th century movement known as the Enlightenment. This was a critical study of science, philosophy, and religion. It denied divine revelation, setting up in its place natural religion.

One prominent aspect of the Enlightenment was known as Deism. This was first made popular by Lord Herbert of Cherburg. Its high point was in the early part of the 18th century. According to this teaching God created the world, then withdrew and refrained from interfering in nature or the affairs of men. Lord Herbert listed five innate ideas with which men were endowed: (1) belief in a Supreme Being, (2) need of worship, (3) pursuit of a virtuous life, (4) repentance, and (5) anticipation of future rewards. These are basic to all religions. He accepted the moral teachings of the Bible, and thought that God expected men to be like Himself—kind, loving, and tolerant.

Deists argued whether divine revelation is possible,

and thought that natural religion is sufficient and certain. They were critical of the pomp and ceremony of church ritual. By the end of the 18th century Deism had become a dominant attitude of upper-class religionists. But Deism eventually dwindled, and in its place arose an attempt to find a morality independent of theology—an ethical system.

Voltaire introduced the Enlightenment into France, where it was directed against popular religious beliefs. While religion demands faith in God, he argued, nature bids us take reason as our guide. Thus in the French Revolution, which was the natural result of this skeptical philosophy, it is not surprising that the Goddess of Reason was set up as an object of worship.

The liberalism of the French Revolution came into America but slowly. Up to 1823 atheist writers were liable to prosecution. But its proponents were working beneath the surface, and when in 1835 German Biblical criticism was "exploded" upon America, it came into conflict with the "Great Awakening." But the churches had become so permeated with liberal ideas that it was impossible for their clergy to stand up and meet the evolutionary ideas of Darwin and Huxley. Before the end of the 19th century they had almost universally capitulated to evolution.

One more movement must be noted in passing, and that is the "day-age" theory held by many churches in the early part of the century. We still hear similar ideas expressed even yet by some who do not understand all the implications in such a theory.

When Buffon wrote his famous *Epoques de la Nature* in 1779, the idea was regarded by some theologians as meaning that the days of creation were indefinite periods of time. This was supplemented by Cuvier's catastrophism, which allowed long periods of time instead of literal days of creation. In 1814 Thomas Chalmers produced an elaborate scheme of reconciliation between the Genesis record and the supposed geological "epochs."

He did this in a very ingenious manner, saying that between the first act of creation, which brought nothing into existence but the material substance of the earth, and the beginning of the Genesis record, periods of vast duration might have intervened—the geological ages. The days of Genesis were, however, actual 24-hour days. In 1820 William Buckland suggested that a system of things might have existed prior to the time covered by the Mosaic record. And in 1859 Hugh Miller stated that he believed that the days of the Mosaic account were not natural days, but great periods of time. Thus the “day-age” theory developed.

This theory held the attention of many Christians until it was finally abandoned because it was impossible to correlate it with the expanding geological knowledge. Note what one writer has to say about it, after attempting to show how the correlation might be made:

“Correlation with the days of creation becomes extremely difficult, if not impossible. . . . It leaves a number of vexing questions unanswered. Many species are said to have become extinct at the close of the Paleozoic era and again at the close of the Mesozoic. The question arises: ‘Why did God let these species become extinct though they were very good?’ We are informed in Genesis 1:31: ‘And God saw every thing that he had made, and, behold, it was very good.’” (64:124, 125)

Some of the difficulties mentioned, for correlating the “day-age” theory with Genesis 1 are: Plants were created on the third day, and the order of their creation does not in any way correspond to the stratigraphical sequences. Furthermore, the record states that when the plants were created on the third day, they included fruit trees, whereas geological sequences do not have fruit trees until well up in the sequence, for the lower plant forms are ferns, horsetails, and plants of that type. The “day-age” theory eventually became less popular because of its inconsistencies, and has now practically died out.

The idea of a gap between verses 1 and 3 of Genesis 1

has been expressed in many different ways but may be summarized as follows: God did not create the world in confusion, but made a perfect creation. Then the world *became* chaotic. A number of translations render the expression "was without form, and void" as *became without form and void*, or similar words. The Rotherham translation reads: "Now the earth had become waste and empty." This confusion was not caused by man's sin, because it took place before man was created. It was due to the rebellion of Lucifer and many angels who followed him. They were on the earth, and desired to ascend to heaven. So Lucifer became the devil, and the earth was cast into a chaotic state for long ages of time. Then in six days God *remade* the earth and created beings upon it. This is one of the modern "ruin and restitution," or "gap," theories.

On the surface these arguments look fairly convincing for a gap of time between verses 1 and 3. But, say the conservatives, other facts are revealed. In the first place it should be noted that the Hebrew was the original language in which this narrative was written. Therefore all other versions are either translations or paraphrases. It is perfectly possible that they reflect the prejudice of the translators and may not give the true meaning of the original.

But even if we allow the use of *became*, does it necessarily mean a descent from perfection to chaos? The word *become* comes from two words. *Be* means to exist; *come* means to appear, to arrive, to be brought into existence. Accordingly we could rightfully render Genesis 1:2 as *and the earth was brought into existence without form, and empty*, or *the earth came into existence in a formless condition*. In other words, when it was created, it was unorganized, and devoid of life. The story of the six-day creation tells how this original state was organized and made into a home for man and animals.

What has been described as the twentieth century definitive defense of the gap theory (164:130), is the book

Without Form and Void, by Arthur Custance, a Canadian scientist. (40) It has quite generally been stated by the opponents of the theory that it is merely an attempt to harmonize Genesis with geological theory. But Custance says his work is in no sense an examination of the geological evidence. Long before modern geological theory was formulated, he says, a hiatus of unknown duration was believed to exist between verses 1 and 2 as witnessed by early Jewish Commentaries and Versions, by the Early Church Fathers, by Medieval writers, and in modern times by some of the greatest Hebrew scholars of Europe.

The exposition of verse 2 by Custance is based almost entirely on the meaning of the Hebrew word which has been translated either *was* or *had become*. He claims that a proper understanding of the word makes the gap theory not only allowable but mandatory.

Whitcomb and Smith (164) challenge these claims. Since their arguments are quite lengthy, we quote only their closing words:

"Dr. Custance is to be commended for a thorough . . . presentation of what is undoubtedly the best possible defense of the Gap Theory. Honestly admitting that several of the traditional supporting arguments are weak, but strangely omitting any discussion of the major Biblical and theological objections to the Gap Theory, he 'puts all his eggs into one basket,' namely the translation of *hayetha* in Genesis 1:2 as 'had become' instead of 'was.' But even here, Dr. Custance has failed to prove his point.

"It seems fair to conclude that if this is the best that can be done for the Gap Theory of Genesis 1:2, it will some day be only a memento in the museum of exegetical foibles." (164:134)

One of the most influential theologians, Bernard Ramm, gives another slant to the gap theory. Instead of postulating the lapse of the earth into a state of chaos, he introduces "progressive creation." Since his works are so widely read, it is in order to comment on what he has written in his *Christian View of Science and Scripture*:

"The Biblical view of nature must be that of a 'very frank creationism.' And this means that it must be teleological. The universe was not only created, but is maintained by the providence of God. God is free to act as He pleases in nature. The laws of nature are the laws of God." (129:82-85)

So far his argument is excellent, but then he introduces a questionable interpretation of certain natural phenomena. Nature was created "good," he says, but not perfect. The lack of perfection is seen in the fact that Adam was commanded to subdue the earth. So far so good, but now Dr. Ramm includes disease, storms, predators, and parasites in the creation plan as some of the factors against which man was supposed to struggle in his attempt to perfect the "good" earth. In this he overlooks the effect of the entrance of sin and the degeneration, decay, and destructive forces set into action by the agency of evil.

He lists four patterns for the origin of things: (1) fiat creationism, (2) theistic evolution, (3) progressive creationism, and (4) naturalistic evolution. Progressive creationism, he asserts, is fundamentally the answer to the arbitrariness of fiat creationism and the uniformitarianism of evolution.

Fiat creationism is unacceptable to some scientists, and evolution is likewise unacceptable to creationists. Ramm chooses progressive creationism as the solution of the problem. In doing so he goes back to the theology of Augustine, with his "secondary" creation. It is what Mivart calls a "continuous evolution toward a preordained end."

In explaining how progressive creation might work, Ramm sets up three steps: (1) certain ideas or concepts were in the mind of God; (2) then God performed a fiat act of creation, which produced the raw materials from which the finished creation was to be developed; and (3) finally there followed a derivative creation. "We believe in several acts of fiat creation in the history of the earth,"

Ramm states. (129:116) In this, conservative creationists would agree if he would confine them to the six days of creation as recorded in Genesis 1, but he proceeds to place them millions of years apart during the popularly accepted geologic history of the earth, which is a point which fundamentalistic creationists resist. Ramm accepts the radioactive dating system at face value.

A further aspect of the story of creation is introduced by Ramm. (129:222) Creation was "revealed" in six days, a day for a tablet. Therefore the six-day record of Genesis was not of events of "creation week," but the record of day by day revelation to Moses. This is about the weakest argument that can be brought against the creation story. As to the Flood, it was not world-wide but was a local flood in Mesopotamia.

Ramm declares that he is not a theistic evolutionist, although he sees no serious fault with the theory. He feels, however, that progressive creation is the better explanation.

While adherents of the "day-age" theory and the "gap theory" may still be found, even at present, Darwin's theory was dominant in the thought of the latter part of the 19th century. As the opposition to his theory dwindled, it left the churches in a dilemma. If they accepted evolution fully, with all that it implied, they would have to become atheists or deists. So they chose the only alternative left that would allow them to accept the scientific theories of the day and still call themselves Christians. They went back to the theistic evolution of the Middle Ages.

Henry M. Morris has made this comment on the current standing of this doctrine:

"If space permitted . . . it would be easily possible to present voluminous documentation of the asserted defection of a large segment of latter-day evangelicalism to theistic evolutionism." (109:90)

Again, he discusses the effect of this teaching on Christianity:

"According to theistic evolution, the divine purpose of evolution was the ultimate creation and redemption of man. How then was it necessary to spend aeons of time in a tortuous drama of evolution to accomplish this purpose? What was the purpose of the trilobites, the dinosaurs, and all the other animals of the distant past, who are said to have lived before man appeared? God is not the Author of Confusion! How could a God of love, looking into the rocks of the earth at the end of the 'Day-Ages' of creation, seeing all the fossil evidence of long ages of catastrophe and death, judge it all to be 'very good'? No wonder that most of the leaders in evolutionary thought . . . do not believe in a personal, purposive God!" (109:92, 93)

Some who are not involved in the scientific aspects of the creation-evolution question, regard the Genesis account as merely another myth, the Hebrew myth, if you please, and of no more value than the myths of the Babylonians or other ancient peoples. Still others look upon it as epic poetry, written by the Hebrew people in an effort to dramatize their ideas of the origin of the earth and its life.

These are some of the problems that have entered into the picture in the last hundred or more years. It has been a distraught and confused situation. But while the majority were following the lead of agnostic scientists, there have been all along a few who have clung to the literal interpretation of Genesis, and have hoped that out of the turmoil would come a "New Creationism" or a "New Diluvialism." And so, let us see what movements there have been in this direction since the turn of the century.

Chapter Eleven

Crusaders for Creation

AS THE 19th century closed, evolutionists were jubilant. Darwinism had been gaining ground in spite of the objections that had been raised against it. The "ages geology" had replaced belief in the short chronology and the universal Flood. Evolution was being hailed as the hope of the human race, for had we not come far from the days of our animal ancestry? And what was to hinder us from advancing to any height whatsoever? University professors taught evolution and uniformitarian geology; churches accepted theistic evolution; and evolutionary teaching permeated the thinking of the man on the street, for it was taught in the schools, preached from the pulpits, and heralded from the press everywhere. It looked as if the golden age of evolutionary progress had arrived.

But evolutionists were in for a surprise; not everyone had accepted their theories. True, a few more or less insignificant church groups still clung to Biblical creation, but their faith had little influence in the scientific world; their arguments were purely theological, and most of the theologians disagreed with their conclusions. Evolutionists apparently had become victorious. Who would dare to dispute their decrees?

The French-Canadian village of Tracadie, Nova Scotia (now New Brunswick), was a fishing village inhabited by

descendants of the early French colonists. In the late 1890's, French was used in the lower grades of the village school, but the upper grades, including the high school grades, were taught in English by a native of New Brunswick, a man of Welsh descent, George McCready Price.

In this village was a government hospital for lepers. Within a few days of getting settled, Price received a call from the medical superintendent of the hospital, Dr. Smith, who was a graduate of Harvard, McGill, and Edinburgh. Finding that the new teacher was interested in literature, Smith asked him if he would read some books on evolution. This opened to Price a new field of thought. He was a member of the Seventh-day Adventist Church, one of the few denominations that had held out doggedly against evolution. He had attended the church college in Battle Creek, Michigan, where his faith in the creation account had been fortified. As Price read on the subject of evolution, he began to realize the profound influence the theory was having on religion and science.

As a government official, Dr. Smith received many government publications, and these, with his personal library, were made available to Price. With little to do outside school hours, the young school principal spent many hours engrossed in perusing scientific literature, taking careful notes of all he read. He became convinced that it was his mission to the world to become a "crusader for creation." He subscribed to the British magazine *Nature*, then, as now, one of the foremost scientific journals in the world. He purchased and read works on geology and the history of geology and other sciences. He devoted every spare moment to the new enterprise, becoming familiar with the backgrounds of evolutionary thought.

In 1902 his first book appeared, *Outlines of Modern Science and Modern Christianity*. (127) This was followed in 1906 by a smaller volume, *Illogical Geology*. (125) He said, in the first book:

"A reform and a return to these primitive principles is the next thing in order for everyone who wishes to get his bearings towards the present problems of either politics or science."

His chief contention was that geology cannot prove that there has been a succession of life. The arrangement of the fossils in the rocks is merely a taxonomic, or classification, series—a cross section, as we might say, of the antediluvian world. This continued to be the theme of his writing for the rest of his long career.

He developed this theme more fully in the second book, in which he said:

"With the myth of life succession dissipated once and forever, the world stands face to face with creation as the direct act of the Infinite God. . . . One verdict—'not proven and not provable'—must be recorded against all grand hypotheses . . . respecting the general succession of life on the globe."

In 1906 Price moved to Loma Linda, California, where the Adventists were building up a medical college. From that time until his retirement in 1938, he taught in Adventist schools, while at the same time spending prodigious amounts of time in research and writing.

His *Back to the Bible* (123), published in 1916, was a challenge to Protestants as a whole. They had, he said, always stood for an open Bible, but Lyell and Darwin had brought a change. They had denied the creation doctrine and the fundamental principles of Protestantism.

"The Protestant church," he declared, ". . . has now . . . surrendered the Guidebook to the dogmatism of undemonstrable science."

The problem was, as he saw it, to vindicate a despised and discarded Bible against so-called science. He carefully traced the development of what he called the modern scientific apostasy. He showed how the vast array of species of plants and animals in the world today are merely Mendelian variations of the original Genesis "kinds."

Price's challenge created a stir in theological circles. He received congratulations from many church leaders. Not only did he gain the attention of the religious world by the publication of this book, but also by articles in leading religious journals such as the *Sunday School Times*, and some scientific and popular magazines.

Naturally his views were ridiculed by the evolutionists, particularly by high school and college biology teachers. They branded him as an ignoramus who threw aside the work of scientists.

But the "crusader" was unmoved by the furor his writings had created, and continued to pour out more volumes. In 1917 he published *Q. E. D.* (128), in which he gave the results of years of research in different fields of science, correlating them with the creation doctrine.

His masterpiece was *The New Geology* (126), published in 1923. This was the first, and to my knowledge, the only textbook of geology written in an attempt to correlate geological data with the Flood theory of geology. It had a large sale for a book of its class, over 15,000 copies, and not only was used in college classes in geology but was purchased by people who wanted to learn how science and the Bible record of creation and the Flood could be harmonized. The book was eventually abandoned as a text by colleges, for it was found to have certain weaknesses, largely due to the author's lack of practical field experience. Nevertheless, it stands as a monument to the efforts of a man who was wholeheartedly committed to the defense of the traditional interpretation of Genesis.

After the publication of *The New Geology* Price found the religious world was not as receptive to his ideas as it had been in his earlier years, but he continued to pour forth a number of volumes and many articles until he was no longer able to write.

A critic and opponent described him as "the last and greatest of the creationists." Bernard Ramm said of him that he "became Fundamentalism's leading apologist in

the domain of geology. . . . The influence of Price is staggering.”

In the school year of 1920-1921 Price taught geology at Pacific Union College, California, and it was there that I first met him. He left the next year, but the geology class was conducted for many years afterward and taught in harmony with the basic principles he had laid down. However, subsequent field observations made necessary the revision of a few interpretations of geological phenomena.

Price had not recognized that ice masses had once covered large areas of Europe and America. But extensive observations made in the northern States and adjoining Canadian provinces revealed evidence that seemed unequivocally to support the glacial theory. Even so, creationists did not find it necessary to accept the long periods of time usually assigned to glaciation by the uniformitarian geologists; rather, they place the period of glaciation after the Flood.

Price taught in his early works that the theory of overthrusts was merely a subterfuge to cover up false interpretations of geologic time. And he never did accept the idea that overthrusts might have a valid place in the Flood theory of geology. But as the evidence on this point appeared incontrovertible, it was incorporated into the writings of many creationists.

A third modification in interpretation was on the point of the sequence of the fossils. Price had stated that the geological formations and systems were classified by their contained fossils on a purely arbitrary basis in order to support their theories of long ages. But the evidence was convincing to creationists that the sequence of fossils must be recognized as valid.

The problem that now faced the “Flood geologists” was how to account for these evidences without abandoning the idea that the Flood was the cause of the major features of geology. In order to make these points clear, I spent much time reviewing geological literature, and in

1946 published *The New Diluvialism*. This book pointed out that the "ice age," as it is called, could be explained quite satisfactorily in terms of the Flood and conditions following it. The sequence of the fossils can be explained in terms of "ecological zonation," the essential principle having been stated by Price many years before, when he characterized the fossils as representing simply the "zoological provinces" of the ancient world. And as to overthrusts, they can be regarded as one of the strongest evidences for terrific tectonic disturbances during and soon after the Flood.

In 1941 Price published the last of his major books, *Genesis Vindicated*. (124) This reviewed all phases of science as he saw them, at a time of great stress between science and religion. He went back over his own work, and attempted to analyze the work of others in the field of scientific research. His analysis has been criticized by some, particularly the physicists, and it may be that he was unable to grasp all the minutiae of the rapidly developing sciences of physics and chemistry. But his summary with regards to the evolutionary theory was very significant. We note a few of his words:

"All seems to have become quiet on the evolutionary front. They still stick to the 'fact' of development of transformation somehow, but they own that they do not know either *why* or *how*."

He argued for a six-day creation, and pointed out that a true interpretation of geology is the key to the controversy between creation and evolution. The educated man, he said, has two choices—either a pantheism which puts nature in the place of God, or recognition of God as the Creator. Deism, although admitting the existence of God, is little better than pantheism or atheism.

He maintained, as he had always done, that the major kinds of plants and animals—the Linnaean "species," as he called them—were the real created units, and that there is no proof for the origin of major types by anything except direct creation. He closed that book with a some-

what pessimistic note, saying: "But I do not expect the world to believe me. I used to think so. . . . But I have no illusions on that point now." Price died January 24, 1963, at the age of 92.

For a while after his passing it looked as if his words were prophetic—that the world would not believe in creationism. But no one can ever tell how far-reaching the influence of his life may be. As I have been writing these studies, I have run across several men who are prominent in the cause of creationism who have acknowledged much inspiration from the writings of George McCready Price. Creationism has shown surprising advancement, and is now gaining ground in the controversy. George McCready Price deserves much credit for giving the movement its initial momentum. But we must not close this chapter without mentioning several other men who have made great contributions to the creationist cause.

In 1909 two consecrated Christian laymen, Lyman and Milton Stewart, contributed funds to publish a series of small booklets known as *The Fundamentals*. These were sent to pastors, evangelists, missionaries, theological professors and students, Sunday-school superintendents, Y.M.C.A. and Y.W.C.A. secretaries in the whole English-speaking world. The sponsors held the conviction that the time had come for a new statement of the fundamentals of Christianity. From this movement came the designation of "Fundamentalists" for those who held to the traditional faith in the inspiration of the Scriptures and the validity of the Biblical records of creation, the fall of man, the Flood, and the atonement. Opposed to this position were proponents of Modernism, who express doubt and skepticism toward these doctrines. While not much space in these booklets was devoted to the Genesis record of creation and the Flood, what was said was firmly in support of the literal interpretation of that record.

Millions of these pamphlets, 65 titles in all, were distributed. In 1958, when the Bible Institute of Los

Angeles celebrated its jubilee year, some men felt that it was fitting and appropriate that *The Fundamentals* be republished. This was done in a volume of 657 pages. (56) In the Editor's Preface we find the following words:

"The conditions of our day are strangely parallel to the times in which these classics were first penned. . . . That the series has met a vital need, and is valuable even now, can be substantiated many times over by the repeated references to *The Fundamentals* in current publications."

During the first half of the century a number of consecrated evangelical pastors and others took up the crusade, and did what they could to counter the impact of evolution upon Christianity. We have space to mention only the most outstanding.

A. C. Dixon was an internationally famous preacher and editor of *The Fundamentals*. As early as 1919 he urged the World's Fundamentals Association to view evolution as equal to Modernism in causing unbelief. He held Darwin responsible for World War I, Communism, and disintegration of the family.

William B. Riley, pastor of the First Baptist church in Minneapolis, was probably the most persistently active clerical spokesman of Fundamentalism during the 1920's. He was an organizer and campaigner, and was prominent in the World's Fundamentals Association. He staged Bible conferences throughout the United States, and engaged evolutionists and modernists in public debate. He attempted to get an anti-evolution law in Minnesota, but was not successful.

John Roach Straton held four debates with Charles Potter in New York City in 1924. Potter was a Unitarian minister whose advocacy of Modernism and evolution prompted some fundamentalists to call him a "rash infidel." Straton was the minister of the Calvary Baptist church in New York. One of the four topics debated was the validity of biological evolution. (154)

Arthur I. Brown, a Vancouver physician, joined the

United States fundamentalistic crusade in 1928. He became a member of the staff of *The Conflict*, organ of the Anti-Evolution League of America. He was a popular lecturer, and was billed as a "renowned scientist" whose research had led him to reject evolution.

According to the fundamentalists, German "paganism" was founded on the brute philosophy of Nietzsche, whose ideas were borrowed from Darwin. Anti-Christian Darwinism reappeared in Communism. They argued that the preservation of Christian America depended on the obliteration of Darwinism and evolution; that of all products of the scientific mind evolution is the most dangerous.

John Roach Straton said:

"The real issue is whether the earth and man originated, or came, by *design*, through the creative power of God, or by chance through the haphazard operation of evolution." (154:115)

William Jennings Bryan was less interested in whether evolution was true or false than he was in its effect on morality. (58:153)

What was the result of the dialogue over science? Fundamentalists discovered some of their weaknesses and the limitations of science were shown up. Although their objections to evolution were primarily theological in nature, the fundamentalists were also quick to challenge the scientific validity of evolution. But there was one serious weakness in their approach to the problem. Most of their scientific arguments were drawn from 19th century writers, and were not adapted to the current scientific development. The only 20th century writer was George McCready Price, and they depended on him very heavily. Many of their arguments were citations from his writings, particularly in the field of geology.

Among the most popular lecturers on creationism in the middle of the century was Harry Rimmer. He was a theologian, not a scientist, yet his books show a familiarity with the current findings of science.

In his *Harmony of Science and Scripture* (132) Rimmer laid down certain fundamental principles that every evangelical Christian must accept. God is eternal, he declared, and is the Creator of all things. The Cosmos must be ruled by law; it could not have come about by chance. Such a creation demands intelligence, and intelligence can reside only in a personality. Therefore God must be a Person. Furthermore, an intelligent God would reveal Himself. The Bible is that Revelation.

After laying down these fundamental principles in the first chapter, the author proceeds to give many arguments to show that Biblical statements are valid whenever they refer to scientific matters.

Another book, *Modern Science and the Genesis Record* (133), goes into much detail regarding the scientific aspects of the days of creation. While he states that it is impossible to know how long these days were, yet he proceeds to give reasons why he believes them to be 24-hour days. The first two verses of Genesis 1 give him some perplexity, and he leans toward the "ruin-and-restitution theory."

The rest of the book is concerned with the evidences of the wisdom of God in the creative acts of the six days. The following statement gives an answer to the question of why we should study science:

"There is only one reason why we thus approach our subject and that is because infidelity has adopted the disguise of physical science. We seek only to show that the ancient writings of the man Moses must have been inspired by the Holy Spirit, for certainly no man in the middle of the seventeenth century before Christ could have known of the marvelous things that are contained in the first chapter of Genesis. To meet the needs of those who doubt, to answer the objections of the infidel, and to set forth from a new angle the undimmed lustre of God's invariable Word, we thus approach this subject in answer to the challenge of infidelity." (133:64)

Many more illustrations might be given of men who

fought to preserve the theological validity of the Genesis record of creation against the inroads of skeptical scientists. But it is a somewhat different picture to note that as the 20th century passed its midpoint, fervor seemed to wane, and more and more evolutionary influences crept into the churches. For example, the American Scientific Affiliation, which started out as a strong advocate of literal creation, gradually swerved toward the left of center, until now, while not officially supporting theistic evolution, it is allowing more and more of a trend in that direction, and many of its leading writers are openly advocating that approach to the problem of the origin of the earth and its life.

It is becoming more and more difficult for conservative writers to gain a hearing in certain publications. Their rigid views regarding the six-day creation are regarded as in the "minority." So much of the Christian press has become influenced by "modernistic" or liberal interpretations that many Christians are wondering just what they are supposed to believe about creation. The old battles of the past century seem to be opening again, and one wonders what kind of conflict is ahead of us.

Chapter Twelve

The Modern Synthesis

DARWIN'S theory of the origin of species appeared to be plausible when viewed superficially; but when examined critically it was seen to be seriously lacking on one vital point. It failed to answer the question as to the manner in which variations took place. Darwin recognized that variations did occur, yet he was at a loss to tell the manner of their origin, or of their transmission.

In 1868, in his *Variation in Animals and Plants under Domestication*, he put forth the theory of *pangenes*, tiny particles that were gathered from all parts of the body and accumulated in the germ cells, the eggs and sperms. According to this idea, much variation would take place, for as the body cells changed, the pangenes would become different. Objections were immediately raised to this theory, which had been said to be the weakest that Darwin formulated. It really embodied Lamarckian doctrine of the inheritance of acquired characters, which scientists reject almost without exception. And it was nothing new, having been suggested by Hippocrates in 400 B.C., and by Aristotle. In modern times Buffon, also, had considered the idea.

The principal objection to the theory of pangenesis was that it offered no mechanism whereby the pangenes could be formed. And a bit later, as the knowledge of

embryology developed, pangenesis became entirely out of the question.

Other schemes were tried. Darwin's cousin, Francis Galton, attempted to apply statistical methods to the problem of heredity, and while he was able to describe and classify the characteristics of various generations statistically, yet he was unable to give any reason for the numerical relations.

Ernst Haeckel proposed what is known as the biogenetic law—that “ontogeny recapitulates phylogeny.” This meant that the individual in its embryonic development passes through the same stages that the species had passed through in its evolutionary history. He drew figures to show the various stages of the embryo—fish stage, etc., through which mammals had gone. But it was found that his drawings were not accurate, and furthermore, the resemblance of different animals was not nearly so exact as claimed. He was actually accused of fraud in making some of the drawings. His theory of recapitulation has been copied by practically all textbooks on biology, and in spite of its flaws it still appears in books, even though it has been rejected by all higher authorities in embryology.

August Weismann criticized Darwin's theory of pangenesis, and substituted in its place the theory of the continuity of the germ plasm. He distinguished two kinds of protoplasm—somatoplasm in the body cells and germplasm in the germ cells. When the germplasm of egg and sperm unite, they form new somatoplasm for the developing body, through which the germplasm is transmitted. The new body does not produce the germplasm, but merely carries it along. Thus the stream of germplasm is independent of changes going on in the body. When Weismann wrote in the last decade of the 19th century, chromosomes had recently been discovered, and he postulated tiny particles in them which he called *ids*. These were the carriers of heredity. Here was a suggestion of what a bit later was developed into the theory of the genes.

Hugo de Vries set up a theory of mutations, from the Latin *mutare*, to change. He said that organisms undergo sudden changes, so that new forms are produced with sharply distinguishable features. These sudden changes, he declared, produce new species. Examples of mutations were the Ancon sheep with very short legs, the Shirley poppy, the Concord grape. William Bateson, the renowned British biologist, made extensive studies on variation, and observed sudden jumps in variation that seemed to support the views of de Vries.

During the time these discussions were going on, the secret of heredity lay awaiting the attention of the scientific world. It had been discovered only a few years after the publication of the *Origin of Species*, but the world had become so absorbed in Darwin's theory that it paid no attention to the new discovery which had been made by Gregor Mendel.

Mendel entered the monastery at Brunn, Moravia, in 1847. He found the duties of a priest distasteful, and was sent in 1851 to the University of Vienna for four terms. Then he returned to Brunn and taught in the Brunn Modern School. He became interested in heredity, and began a series of experiments on peas in the monastery garden. His experiments revealed the secret which he sought, and in 1865 he reported his work at a meeting of the Brunn Society for the Study of Natural Science. His paper was published in 1866, but the journal was not widely known, and even those scientists who did see the report did not realize the tremendous significance of it. When in 1900 three European biologists simultaneously discovered the same principles, Mendel was given credit; the laws were called "Mendelian laws" of heredity.

Chromosomes had been discovered in 1873, but they were not named as such until 1888. During the latter part of the century a large amount of investigation was carried on regarding their behavior. When Mendel's laws were discovered, it was seen that the distribution of hereditary characters from generation to generation closely paral-

leled the distribution of the chromosomes, and eventually they were linked with Mendel's laws. This gave a fruitful line of study, which was immediately picked up by several research workers. During the first two decades of the 1900's tremendous advancement was made in the laws governing inheritance, and in the nature of the chromosomes and their particulate structure.

Thomas Hunt Morgan was doubtless the most prominent of these investigators. Beginning in 1900, he undertook to carry on experiments on the common fruit fly, *Drosophila melanogaster*, which could easily be bred in milk bottles in the laboratory. Tens of thousands of flies were bred to determine the transmission of hereditary characters. (*Character* is the technical term used by geneticists for hereditary characteristics.) His work was largely carried on at Columbia University. In 1919 he published the *Physiological Basis of Heredity* (100), and the climax of his brilliant work was his *Theory of the Gene* (101) in 1926. This book established the gene theory firmly in modern biology.

The work of Morgan and his colleagues had a profound effect on Darwinism. Evolutionists were obliged to make many changes in their views and to accommodate the evolutionary theory to the new knowledge of genetics. Thus there arose what is known as Neo-Darwinism, which is Darwinism interpreted in terms of Mendelism. We cannot help but wonder what would have happened to Darwin's ideas if Mendelism had been brought to light a few years before 1859. Anyway, when Neo-Darwinism did appear, it was not materially better able to solve the problem of the origin of species than were the original Darwinism concepts. It was still unable to answer the question as to what causes variation.

It is highly enlightening to read the statements made by leading geneticists during the first half of this century regarding this problem, and to see how more recent studies have dealt with it.

William Bateson, the world's greatest authority of his

time with regard to genetics, delivered two speeches on Mendelism, one at the meeting of the British Association for the Advancement of Science at Melbourne, Australia, on August 14, 1914, and another at Sydney on August 20. He said:

"Somewhat reluctantly, and rather from a sense of duty, I have devoted most of the address to the evolutionary aspects of genetic research. . . . The outcome as you will have seen is negative, destroying much that till lately passed for gospel.

"At Melbourne I spoke of the new knowledge . . . which Mendelian analysis has brought us. . . . And the chief conclusion I drew was the negative one, that, although we must hold to our faith in the evolution of species, there is little evidence as to how it came about, and no clear proof that the process is continuing to any considerable degree at the present time."—*Science*, August 28 and September 4, 1914.

In 1921 Bateson gave an address before the American Association for the Advancement of Science, in Toronto, Canada. The address, entitled "Evolutionary Faith and Modern Doubts," was given to a crowded house, with many prominent scientists of England and America present. Here is one of his remarks:

"We cannot see how differentiation of species came about. Variation of many kinds, often considerable, we daily witness, but no origin of species. Meanwhile, though our faith in evolution stands unshaken, we have no acceptable account for the origin of species." (21:45)

In another speech a year later Bateson asserted that variations that had been studied in nature had, when critically tested, failed to give evidence for the origin of new species.

These statements from one of the most eminent geneticists of the time furnished ammunition for the anti-evolutionists for many years, and were quoted widely. Dodson in his *Textbook of Evolution* has characterized this period of controversy as the time of agnosticism.

(48:97) The result of Bateson's speech, he says, brought evolutionary investigation practically to a standstill for a while, until further light could be shed on the problem.

The first scientist of repute to come forward with a solution to the problem was Austin H. Clark, a member of the staff of the National Museum and the Smithsonian Institution. In 1930 his *Zoogenesis* made a clear distinction between the origin of the major groups and that of genera and species. Although most evolutionists discounted his thesis, his concepts were in harmony with what creationists a little later used as basic arguments for their interpretation of the origin of species. Two paragraphs from his book illustrate the point:

"All the major groups of animals have maintained the same relationship to each other from the very first. The characteristic features of these major groups have undergone no change whatever. Crustaceans have always been crustaceans, echinoderms have always been echinoderms, and mollusks have always been mollusks. There is not the slightest evidence which supports any other viewpoint.

"Yet on the other hand *within* each major group there has been constant and continual change from age to age. All of the crustaceans, echinoderms, and mollusks of the present day are more or less, and often widely, different from the representatives of those groups which flourished in the distant past." (20:114)

Here, while admitting what every biologist knows, that there has been a change *within* the major groups, he challenges the basic assumption of evolution, that there has been change from one major group to another. This did not mean that he was a creationist, however, for he proposed an explanation for the origin of the major groups that was so radical that even the most ardent evolutionists hesitated to approve it. He suggested that originally all life existed in the form of single cells, from which all types had branched out concurrently. Here are his own words on the subject:

"All the available facts lead to the conclusion that the

major groups of animals appeared simultaneously, or nearly so, in essentially the same form as that in which we know them now by a process of *concurrent evolution*." (20:260)

It is interesting to note that this is close to the position taken by the creationists, that all major types appeared simultaneously; but instead of coming by some "concurrent evolution" they came by the command of the Creator.

In 1933 Ludvig von Bertalanffy, in his *Modern Theories of Development* (6), stated that the biologists were facing a strange and disturbing spectacle. The recognition of the fact that the genes govern heredity, he said, could apply only to the cells *after* they had developed. It fails to account for the manner in which anatomical structures come to take the form they do, in order to give heredity a field in which to operate.

The next few years after Bertalanffy made these statements a new fund of information, which seemed to clarify the problem and open the way to a solution, appeared. Geneticists began to realize that the genes actually do control embryonic development as well as life processes after development. It was suggested that they liberated activators, or "growth hormones," at the exact stages of development in which they are needed to properly and harmoniously bring about the complete growth of the organism. But just how these substances were produced was still a mystery.

During the winter of 1932-1933 Richard Goldschmidt, who at that time was considered perhaps the world's greatest geneticist, gave a lecture at the University of California at Berkeley. He reported on the experiments he had been conducting for over twenty years on gypsy moths. Breeding together moths from all over the world, generation after generation, he had hoped to produce what might be called a new type, and thus demonstrate Darwin's theory of the origin of species. But after all that time, he said, his results were negative. Gypsy

moths produced nothing but gypsy moths. The variants always turned back toward the mean of the species.

In 1940 the ideas which he had presented in this lecture were elaborated in his book *The Material Basis of Evolution*. He argued that subspecies, or varieties as they are commonly known, are not incipient species, that is, species in the making, as was commonly thought. They were, he said, "more or less blind alleys within the species." (63:183)

Goldschmidt attempted, as did A. H. Clark, to present an evolution model in which major changes could come about suddenly, by what he called megaevolution. But his suggestions did not meet with much favor.

For the next twelve or fifteen years the controversy continued between the Darwinians and those who followed Goldschmidt. Edward O. Dodson, in *Textbook of Evolution* (48:viii), points out that either side has no decisive case as yet. He states that most studies have been made on the lower groups, the genera and species, and that attempts have been made to apply the knowledge thus gained to the higher categories. But with all these efforts to prove the evolution of the higher categories, or major groups, the problem is still unsolved.

Theodosius Dobzhansky attempted to answer Goldschmidt in his *Evolution, Genetics, and Man*. (47) He discussed all phases of variation, breeding, and geographic distribution, and attempted to bring all of Goldschmidt's data into harmony with the evolutionary interpretation. But all he did was to assume that evolution had resulted in these forms under discussion; he gave no positive proofs. On the other hand he admitted (47:165) that species are, as he puts it, "genetically closed systems" because they seldom if ever are able to exchange genes with one another.

One of the most striking aspects of the creation-evolution controversy has been the gradual growth of a concept that has attempted to express all processes in the universe in terms of evolution.

The concept of evolution as a universal system of thought is well illustrated by the remarks of Julian Huxley in his presidential address before the British Association for the Advancement of Science in London in 1936. He stated that evolution is the most important of all problems of science. It involves, supposedly, all fields—ecology, genetics, paleontology, comparative anatomy—and derives support from geology, geography, and mathematics. And he might have added physics, astronomy, and chemistry, had he been speaking in our time. Biology, he asserted, was embarking on a movement toward unification of all science under the cause of evolution. (75:13)

One thing that Huxley failed to recognize is that all of these factors can with equal validity be correlated under the philosophy of special creation. But having only the evolutionary background to guide his thinking, he saw in all the various factors merely a verification of Darwinism. This is an illustration of how a certain bent of mind influences a man's thought. In his analysis of the situation he outlined what he called "biological improvement." Four categories are listed. Let us notice them briefly:

1. *Specialization*. This, he says, is one-sided improvement. It causes animals to sacrifice one set of organs for the sake of others in order to survive.

2. *Degeneration*. Parasites are given as examples of this peculiar type of "evolution."

3. *Stability*. This is the case where evolution ceases to "evolve," but stands still. That is, an animal is so well adapted to its environment that it no longer evolves.

4. *Simplification*. This is the case where some types have become complete and then reverted to a simpler form. (75:567)

Here is a good example of how evolution is invoked to synthesize all types of situations found in nature. Whether variation is in the direction of more complexity or in the reverse, or no change at all, it is evolution. But here again we might point out that the creationists have

been able to relate all these situations to the creationist philosophy, along with the attendant degeneracy they recognize as having come into the world as the result of the reign of sin.

On page 571 Huxley gives another example of the evolutionary interpretation—the modern synthesis he is trying to establish. He says that evolution is a series of blind alleys. Some are short, ending in new genera or species that remain static or become extinct. Some are long, varying for “millions of years”—that is, through many geological strata. As examples he cites the echinoderms, which are most abundant in the Mesozoic rocks, the arthropods in the Cenozoic, birds in the Miocene, and mammals in the Pliocene. All these examples, which the creationist can interpret as cases of ecological zonation in the ancient world, are viewed as evidences of evolutionary advance or retreat or stabilization. This is the thesis: *Evolution is everything*. It is this extreme application of a hypothesis to the facts of science to which creationists object.

The climax of all this discussion came in 1959 at the Darwin Centennial at the University of Chicago, where many distinguished evolutionists sat for five days and discussed all phases of the evolutionary theory, particularly as related to Darwinism. The keynote was sounded by Huxley when he said:

“All reputable evolutionary biologists now agree that the evolution of life is directed by the process of natural selection, and by nothing else.” (156:III:265)

Huxley is well known as one of the world's most ardent advocates of evolution, and his remarks express the views of the evolutionary side of the question. But it should be noted that it was merely taken for granted that “all scientists of repute” believe in evolution. In taking this position, his whole emphasis was on the thesis that it is possible to explain the origin of “species” by natural selection, isolation, and such factors. Creationists themselves recognize that not all the present array of over a

million "species" of animals and one-third as many of plants were created as such. They have come about, as A. H. Clark said, by changes *within* the major groups, and many are only varieties that are interfertile. But what the illustrious speakers failed to show was how any of the known processes of change are able to account for the origin of the higher categories.

This meeting in Chicago emphasized what is known as the "Modern Synthesis." Commenting on its rise, Dodson remarked that while studies on evolution were suspended after the criticisms that were leveled at it by Bateson, A. H. Clark, and others, studies in many branches of biology were carried on, and the "stumbling blocks" to evolution removed and the way opened for this modern synthesis.

But what does it have to offer that has not been gone over before? Only more detail, but no new solution to the problem. Much study has been given to population genetics, ecology, physiology, geographical distribution, and many other lines of biology, and a mass of data has been accumulated. On the level of the higher categories the supreme effort has been to apply the same principles that were found to explain the origin of the lower groups. But, as Dodson said (48:390), perhaps enthusiasm has run too high. Maybe scientists are not so close to a solution as has been hoped.

True, the knowledge of how the minor groups have arisen has been developed to an impressive degree. But how the major groups arose is as much a mystery as ever. The same old line of argument for evolution has been reiterated, but with no positive proofs beyond the species or genus levels. The newest discoveries in anthropology have been offered, but with the same lack of proof, as we shall see in a later study. Nothing has been brought out to change the problem that has not been discussed for the past century.

Possibly nowhere else can such a striking example of the "Modern Synthesis" be found as that in the *Atlas of*

Evolution, by de Beer. This profusely illustrated volume of 200 large pages touches on every main aspect of biology and paleontology and interprets everything in accord with Darwinism. It is interesting to note that after de Beer quotes from Darwin as to the ethical and spiritual result of his believing in evolution, de Beer makes the following comment:

“‘What a book a devil’s chaplain might write on the clumsy, wasteful, blundering, low, and horribly cruel works of nature . . . , but this very fact enabled him to claim that there was some human comfort in the conclusion that these frightful events formed no part of the fulfillment of a detailed design. . . . ‘From death, famine, rapine, and the concealed war of nature we can see the highest good, which we can conceive, the creation of the higher animals has directly come. . . . In a state of perplexity . . . my theology is a simple muddle. I cannot look at the universe as the result of blind chance, yet I can see no evidence of beneficent design, or indeed of design of any kind, in the details.’” (45:5)

Then de Beer states his conviction that when confronted with Darwin’s dilemma, the scientist can only acknowledge the laws of nature and not feel himself competent to express any opinion as to why they are as they are. After making this pronouncement, he proceeds to elaborate on nature and to show how every phase of plant and animal life, the fossils, and man himself, fits into the general picture of evolutionary progress and development.

The first basic principle of de Beer’s “synthesis” is the “fact” that evolution has taken place; this is assumed, and everyone is expected to agree. Uniformitarianism is invoked to explain everything. There is no longer any need for belief in catastrophism; it has been relegated to the rubbish heap.

A variety of adaptations are shown, each supposed to be the result of evolution. No thought is given to the possibility that these might have arisen from original

created types. Such a case is that of the finches of Galapagos, which convinced Darwin that evolution is true. And yet some scientists, skeptical of the validity of the argument from the Galapagos finches, have discovered that the supposed evidence for evolution has been misinterpreted—that it is nothing more than change within the types.

A number of examples of geographical distribution bear the same interpretation—variation within the original kinds.

Under the heading, "How Evolution Works," all kinds of variation, mutations, gene and chromosome changes, are illustrated. Natural selection is set up as the explanation of the variety seen among plants and animals. The classic Darwinian argument of the origin of species by natural selection is reviewed and fully accepted, as if there was nothing else possible.

In the chapter on "The Major Steps of Evolution" the average reader will be so confused that he may be unable to escape from the mesh that entangles him. The chemical basis of life, DNA, and the processes by which simple forms "evolved" into higher forms—all are forcefully portrayed in words and pictures. The supposed phylogeny of plants and animals is shown by elaborate charts, but with no proof that they are valid. The postulated course of evolution in plants and animals is described; however, no mention is made of specific objections raised by many scientists to these supposed stages of change. And in the final chapter the course of human evolution is "traced" in detail from the apelike ancestors to *Homo sapiens*.

When such a monumental work as this is sent out to the general public, is it any wonder that evolution is commonly accepted? And yet, why are not two sides of the case presented? Has the "Modern Synthesis" so completely eliminated creationism that there is no place for it?

Hardly. Much work has been done of late in cellular

biology—studies into the mechanism of the cell whereby growth and reproduction take place. In this latest knowledge regarding the genes, creationists take an optimistic attitude.

In 1953, A. D. Hershey demonstrated the fact that DNA (deoxyribonucleic acid) is the primary material of a virus. This idea was followed up with experimental work on viruses, and this led to the theory that DNA carries the genetic information in all cells. J. D. Watson and F. H. C. Crick have set up the DNA model. According to this a gene consists of a double spiral of sugar-phosphate strands, connected by base pairs of adenine and thymine, and cytosine and guanine. The order of these pairs of nucleotides, as they are called, form the “code” that determines genetic characteristics. Mutations are caused by “errors” or “mistakes” in the formation of these coded characters.

But the story is not as simple as it sounds. Before growth can take place in any cell, proteins have to be manufactured in harmony with the “genetic code” in the genes. This appears to be accomplished in a remarkable manner. The DNA molecule produces a “template” or pattern of its own structure. This is known as the “messenger RNA.” It passes out of the nucleus of the cell into the cytoplasm, where it comes into contact with tiny bodies known as ribosomes. Following the pattern contained in the RNA, these ribosomes manufacture the desired proteins.

Creationist scientists hold that any great departure from the type plan is impossible, although small variations might be made. For one type to change into another suddenly, as the fossil record seems to indicate, not one nor two but a large number of cells would have to mutate simultaneously. But this is impossible to conceive. On the basis of the new knowledge of cell biology, creationists are confident that the evidence is on the side of special creation rather than evolution.

Another of the major problems now being studied is

the question of what life is, and how it can be produced. Rather elaborate claims have recently been made to the effect that life has actually been produced in the test tube. But is it true?

From antiquity until late times man believed that life originated by spontaneous generation. It took the brilliant experiments of Louis Pasteur to show that in micro-organisms, at least, spontaneous generation does not occur. And yet, creationists argue, unless one is willing to admit that the original life was created by God, spontaneous generation is the only alternative. Thus the view that what is now regarded as impossible must somehow have been possible in the past would be forced upon us. This is not scientific knowledge based on observation, but pure speculation, without any basis in fact.

What actually was done in the laboratory was not to produce any new living form. Viruses were taken apart and recombined in a somewhat different arrangement. This is not creation in any true sense of the word.

In the field of taxonomy extensive studies are being made in both plants and animals. Elaborate diagrams are being constructed to show the relation between one group and another, and thus to represent how evolution took place. Against this effort the creationists point out that all the changes that can be shown to be valid are within the major groups, not from one to another. John N. Moore, Managing Editor of the *Creation Research Society Quarterly*, writes a very conclusive refutation of the claim that one group of plants or animals can be traced to another. Note his words:

"No change from one animal form into another . . . has been shown or reported. . . . Clear documentation for this position is available in the 1967 publication, *The Fossil Record*, . . . jointly sponsored by the Geological Society of London and the Palaeontological Association of England. . . . In this research volume, some 120 scientists, all specialists, prepared 30 chapters in a monumental work of over 800 pages to present the fossil record for plants

and animals divided into about 2,500 groups.”

He tells us that 71 charts were prepared to show relationships, but when any possible connections were shown between groups, it was always *within* the major groups. The conclusion drawn from these charts, he says, was that “Each major form or kind of plant and animal is shown to have a separate and distinct history from all the other forms or kinds.” (97:108,109)

This is only one example of a host of articles and books that are being published by creationists as they challenge the claims of evolutionists. The studies being made by creationists in both fields, biology and geology, are presenting to evolution a real challenge. Developments along this line will bear watching, for they are proving to be very significant.

Chapter Thirteen

How Old Is the Earth?

AS OLD problems are solved, and new information reveals many previously unknown secrets, the increase of knowledge raises new questions and poses new problems, both for evolutionists and creationists. Sometimes an answer to a baffling question raises other questions even more baffling. And so the quest for truth goes on. After all, truth can be known only approximately. Neither scientists nor theologians ever hope to arrive at absolute truth.

One of the more recent fields of controversy that has occupied the minds of scientists for many years is that of geochronology, or "age-dating," as it is commonly known. Over and over the question is asked: How old is the earth? Many methods of determining geologic time have been proposed, but no one of them is without its faults.

Lord Kelvin surmised that a hundred million years ago the physical conditions of the earth were entirely different from what they are now. Joly estimated that it took the sea from eighty to a hundred million years to reach its present state of salinity. The age of the earth as figured by the thickness of the sedimentary rocks was supposed to be between 20 and a 100 million years.

An outstanding example of time estimates is found in

the Green River shales in Wyoming. These show an alternating of laminae with much and little carbon. It is assumed that the high carbon was laid down in summer, the low carbon in winter.

One outstanding example of these shales is seen in the hills around the old railroad station of Fossil, west of Kemmerer. Here, in one place a cliff rises over 1,000 feet. It consists of thousands of thin laminae, or varves. The varves are about $1/2000$ of a foot thick. It has been estimated that it took between 5 and 6 million years to deposit these beds. It has not been explained how the multitudes of fish entombed in these rocks could have remained in such a perfect state of preservation, with every bone, and even the scales, showing clearly, if they had had to lie for the time necessary for enough mud to cover them with thin laminae by natural processes.

By dendrochronology, or tree-ring analysis, experts gain fairly close results back about 3,000 years. In fact, the oldest living things on earth, the bristlecone pines of the White Mountains of California, have been dated at about 4,600 years by matching sequences of ring counts. But even here a certain degree of uncertainty is present, for it is known that under certain conditions a tree may put on more than one ring a year. Since we do not know the conditions prevailing when these trees were young, we cannot be sure that the age-estimate is correct.

The method of age-dating most commonly used in establishing "short" chronology, up to a theoretical 50,000 years, is that of carbon-14. Uranium-lead, potassium-argon, and similar methods profess to give dates back as much as 4.5 billion years.

W. F. Libby developed a dating process by means of radioactive carbon-14 while working at the Institute of Nuclear Studies and the Chemistry Department of the University of Chicago, between the years 1945 and 1959. Since this discovery, more than 20,000 tests have been made on all kinds of organic matter, such as wood, bone, coal, and charcoal. It has been found that when the results

of the tests can be correlated with known historical dates, the carbon-14 tests are usually in reasonable agreement. Reliably established historical dates do not extend beyond the second millenium B.C.

When Libby's ideas first became known they caused some consternation among creationists, as they would push the time that life began on earth back far beyond the traditional date of creation. In 1953 Robert W. Woods, a college physics teacher, wrote the first rebuttal to the new time scale that the carbon-14 method suggested. In the following paragraphs is given a brief synopsis of his views. (169)

The atmosphere had "waters above the firmament" before the Flood, which acted as a radiation-absorbing shield. (Not all creationists accept this vapor-shield theory.) The Flood catastrophe would have brought large amounts of water down to the earth, resulting in a change in the nature of the upper atmosphere. Not only so, but much of the already existing carbon-14, if there was any, would have been dissolved in the waters above the firmament and precipitated at the Flood. This would result in a very low concentration immediately after the Flood. Therefore specimens of plants and animals living before the Flood or immediately after, would be dated as very old when tested by present-day concentrations.

Woods suggested the increase in carbon-14 radiation after the Flood as a possible cause of the shortening of human life. He gave several examples of specimens that are dated erroneously because the Flood factor has not been recognized.

Buffalos and mammoths buried in ice have been dated at 28,000 years. He suggests that they might have been caught by the Flood and suddenly frozen. Coffin, however, believes that the mammoths lived soon after the Flood. The dating would be about the same, whether they lived before or immediately after.

Peat bogs dated about 20,000 years might be a mixture of postdiluvian marsh plants with antediluvian vegeta-

tion, thus producing a low carbon-14 content. Logs dating the same might be explained in like manner.

Charcoal from caves whose location could be nothing but postdiluvian, date from 15,000 to 30,000 years. This could have been from fires built from antediluvian driftwood.

Dates for the first appearance of man at around 9,000 years would have been before the concentration had risen to the present value of concentration.

Details regarding these specimens have been somewhat modified since Woods presented them, but the principle has been generally followed by most creationist writers since that time.

Robert H. Brown, a physicist who has studied radioactive dating extensively, and who wrote a chapter on the subject in Coffin's book, *Creation—Accident or Design?* (34), wrote the following comment:

"No material with a precise and firmly established historical age has become available for determining a correlation for radiocarbon dates prior to the nineteenth century B.C. Significant attempts to accomplish this have made use of Bristlecone Pine wood fiber which has been dated by growth-ring counting techniques. Bristlecone Pine wood fiber has become available that dendrochronologists estimate grew in 5116 B.C. at the present site from which it was collected. This fiber was not obtained from a piece of wood that contained 7,000 consecutive growth rings. Consecutive growth rings in recently growing wood samples do not exceed beyond 200 B.C. The proposed sequence to 5116 B.C. has been obtained by matching growth-ring patterns in sections from many pieces of ancient wood. It involves uncertainties concerning Bristlecone Pine growth characteristics in the differing climatic conditions of prehistoric times, and also uncertainties in the radiocarbon dating used to assist in matching one piece of wood against another." (10)

Brown further comments on some of the other problems of dating:

“Several discoveries of prehistoric animals also have provided data to suggest that there was a period after the Flood during which the relative activity levels of carbon-14 were increasing. Hair from the Beresovka mammoth that was found in the Lena River delta region of Russia has a radiocarbon age of 26,000, while the radiocarbon age of peat only eighteen inches above the carcass is 5,610. At normal growth rates, between 500-2,000 solar years would be required for the development of an eighteen-inch peat layer.

“Muscle tissue from beneath the scalp of a mummified musk ox found in frozen muck at Fairbanks Creek, Alaska, has a radiocarbon age of 24,000, while the radiocarbon age of hair from a hind limb of the carcass is 7,200. A life span exceeding 7,000 years for a specimen of this species is doubtful.

“In a gravel deposit at the Union Pacific Mammoth Site near Rawlins, Wyoming, a mammoth skeleton was found together with artifacts that indicate that the animal was killed by man. Radiocarbon dating of ivory from the center of the tusks established the kill date at approximately 11,500 radiocarbon years ago. Wood fragments from the gravel in which the remains were buried have a radiocarbon age of approximately 5,000. The bones would not have survived 6,000 solar years of exposure, nor could they be expected to remain in an articulate relationship during erosion and reburial by natural processes.

“A mastodon skeleton found at Ferguson Farm near Tupperville, Ontario, provided a radiocarbon age of 8,900 for the collagen fraction of bones and a radiocarbon age of 6,200 for high-organic-content mud from within the skull cavities. It is unlikely that this skeleton could have survived exposure for 2,700 solar years before emplacement in peat.” (10)

No radiocarbon laboratory worker today pretends that the figures obtained from these tests are actual years, but are only relative time periods. They speak of “carbon-14

years,” not calendar years. But how much discrepancy there may be, is not clear.

Much study has been given to the amount of carbon-14 in bogs. Ideally it should be expected that the amount would decrease gradually and uniformly as the depth increases. But this is not the case. Recent studies along this line have been evaluated in an article in *Origins*, a journal published by the Geoscience Research Institute. (9)

The report covers all localities where meaningful data has been obtained on carbon-14 dates going back as far as 45,000 “years.” The dominant tendency is for carbon-14 to decrease more rapidly than would normally be expected. These studies strongly indicate, if not actually establish, the fact that concentration of carbon-14 actually increased as the bog was formed. That is, the lower layers had less than the upper ones, as they were laid down.

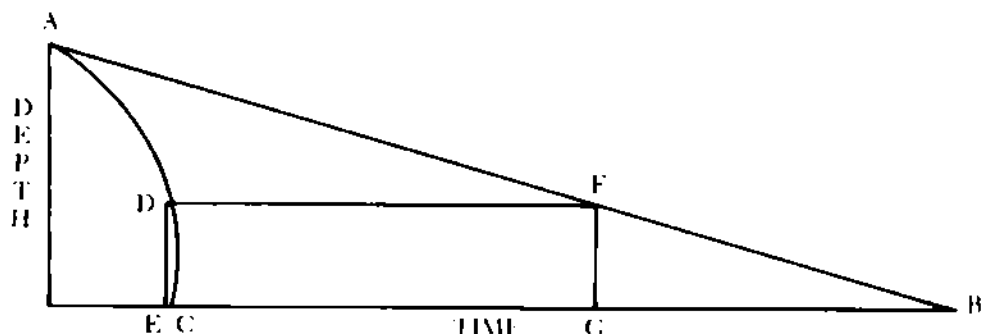
Tests on material that, according to the Flood theory, would have been in existence after that event, show as much as 30,000 years. Claims have been made that tests on coal show the same age. However, these reports are somewhat uncertain and inconclusive at this time. As a whole, though, the evidence seems to be growing that carbon-14 can be correlated with a comparatively recent burial.

Perhaps it will make the matter clearer if a graph is given to illustrate the principle of carbon-14 in the light of the evolution and creation models, respectively. This will show the difference in age between uniform amounts in the atmosphere and how the amount decreases as the time scale recedes.

The vertical scale represents the depth of a bog. The horizontal scale represents time. No exact number of years can be given, since this is a simulated situation.

A-B shows the decreased amounts of carbon-14 in a specimen as its age increases, until it reaches a point where it cannot be recognized, theoretically about 30,000 to 50,000 years.

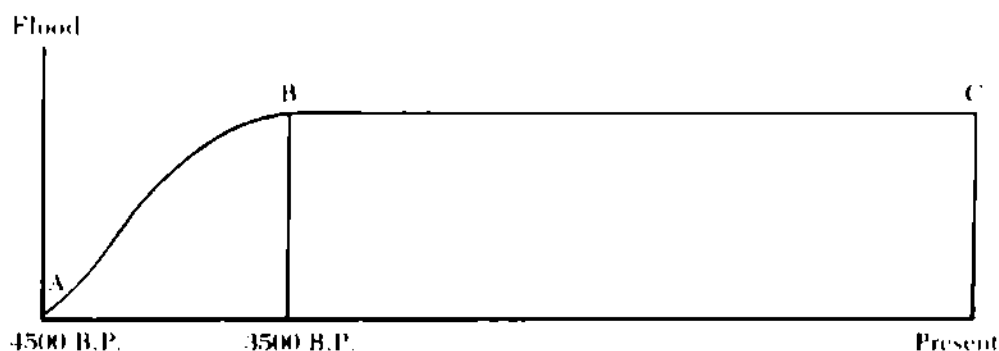
A-C shows what would happen if there were not uniform amounts of carbon-14 in the atmosphere, but it decreased rapidly as one goes back in time. The smaller amounts in the specimens as the depths of the bog are reached would be represented by D. On the uniform scale these would be on the level with F.



F-G represents the apparent age, G, whereas D-E represents the actual age, E. This shows how false dating can be obtained.

The rapid increase downward in the bog is demonstrated by a large number of tests the world over, indicating that bogs are not as old as the carbon-14 dates make them appear.

Based on the preceding figure, the following diagram will illustrate how creationists can account for the difference between the apparent age of carbon-14 in specimens at the Flood and after, as compared with the true age.



It is assumed that carbon-14 was totally or nearly nonexistent before the Flood. Changes in the earth's atmosphere allowed it to accumulate. The curve A-B represents a period of perhaps a thousand years before its concentration in the atmosphere reached the saturation point. This shows how carbon-14 tests as far back as 3500 B.P. (before present) correlate with actual historical dates. Back of that point (approximately) the smaller and smaller amounts would make early specimens appear to be much older than they really are, as the former diagram showed.

The radioactivity of uranium was discovered by Henry Becquerel, the French physicist, in 1896. In 1907 B. B. Boltwood, of Yale, published a list of geological ages based on radioactivity. But it was not until after 1920 that adequately refined methods of determining the uranium content and related chemicals of rocks were devised. Since then many determinations have been made, and an elaborate system of dating the rocks has been established. Whether it is the uranium-lead, potassium-argon, or other similar method, the basic principle is the same.

Uranium-238 disintegrates and passes through a series of intermediate products until it finally becomes lead-206. This process is extremely slow, but, as far as laboratory tests show, is always uniform. Therefore the physicists say that by measuring the amount of uranium and lead in a rock, they can determine by the proportions how long since the rock was molten. On this principle rocks are dated in millions and billions of years.

Against these claims the creationists point out that for the method to be valid, (1) the initial amount of lead-206 must be accurately specified, (2) the rate of decay must have remained constant, and (3) there must have been no gain nor loss of uranium and its decay products from or to the surrounding material. None of these assumptions, it is asserted, can be checked experimentally; therefore the uranium-lead method is faulty and cannot be depended on.

Furthermore they point out that it is possible that processes going on at the time of creation or during the Flood might have altered the uranium-lead ratio, and thus created a situation that would give radiometric ages that cannot be interpreted in terms of real time.

Studies on recent volcanic rocks have been reported by a British consulting engineer, and he finds that there are serious discrepancies in their "age-dating" by conventional methods. Research on ten samples from the Azores, Tristan de Cunha, and Vesuvius, of rocks known to be very young, give "ages" all the way from 100 million to 10.5 billion years.

"The conclusion which can be drawn from these facts, which applies equally to dating of all mineral-bearing rocks, is that calculated [radiometric] ages give no indication whatever of the [real time] age of the host rocks. In cases where calculated [radiometric] ages are millions of years, the rocks could be quite young.

"Furthermore, these ages have no relationship to the age of the earth, because of course, the various ages computed varied so widely. Consequently ratios of parent and daughter elements are merely ratios, and their use as a base for projecting 'ages' of the rocks, or of the earth itself, is highly questionable and fraught with many assumptions that cannot be checked." (33)

Discussing the inorganic age-dating problem, Brown (5a) has a number of very striking examples. For instance:

The assumption that when molten material came up from the depths of the earth the uranium-lead or potassium-argon ratio was reduced to zero—that is, all the lead or argon was volatilized, so that the clock was set at zero—this assumption has not proved to be reliable. Volcanic material from New Zealand with ages ranging from 145,000 to 465,000 years overlies destroyed trees with a radiocarbon age of only 225 years. The 1801 eruption of Hualalai in Hawaii produced lava that has a potassium-argon age of 1.1 million years and contains components with potassium-argon ages exceeding a billion years.

Granitic components in tuff from the 1912 eruption of Katmai volcano in Alaska have potassium-argon ages of about four million years. Submarine lavas produced by recent eruptions of Kilauea volcano in Hawaii have potassium-argon ages as great as 43 million years.

It has been recently reported that dating from a single lava flow in the Pacific Northwest showed variation of several hundred millions of years in the same flow, which apparently had come out under water, and might have been subjected to different conditions at different depths.

It is generally agreed among astronomers that the approximately 5 billion years dating of the rocks also indicates the age of the solar system. This question of the age of the universe, its evolution, and present status, therefore, lies close to the whole problem of age dating. Brief notice should be given to this aspect of the situation, although not much has been written on it by creationists.

The September, 1975, issue of *Scientific American* devoted all of its main articles to the solar system. A. G. W. Cameron, Professor of Astronomy at Harvard University and Associate Director for Planetary Sciences of the Center for Astrophysics in Cambridge, Massachusetts, wrote an article on the history of theories of evolutionary astronomy and gave the current lines of study that have developed the present belief in it. (16) A few points from this article may be noted.

In 1644 Rene Descartes, the noted French philosopher, proposed the concept of a primitive solar nebula, or disk, of gas. Out of this were formed the sun and the planets. In 1745 Georges Buffon, French naturalist, suggested that a foreign body, perhaps a comet, came close to the sun and ripped out some of its material, from which the planets were formed. For two centuries popular opinion swung back and forth between these two hypotheses. Today most astronomers favor Descartes' view.

The past 30 years have brought to light a vast amount of new information regarding the solar system, with the

result that theories regarding its evolution, as well as the evolution of stars in general, have been greatly modified.

Several pages of the Cameron article are devoted to a discussion of the planets, comets, asteroids, and related topics. The time necessary for the condensation of gaseous material, its heating and cooling, is explored. Attempts are made at constructing models for the various processes involved. But it is interesting to note the author's conclusion.

Many of the details, he says, still are highly speculative, and probably will have to be revised as new information comes to light. In telling the story he was strongly influenced by his own *beliefs*; in other words, the picture is highly subjective. Other writers would without doubt produce quite a different interpretation, for the questions involved in this study are still far from answered.

What have creationists had to say about the question of stellar evolution? Very little. Most of them take the attitude that the creation record of Genesis deals only with this earth and that the heavenly bodies are only given incidental notice. Therefore it is not necessary to know, or even attempt to know, how the rest of the universe was formed. Just as Cameron admitted that his own beliefs were a strong factor in leading to the conclusions he did, so the creationists have said that their beliefs did not allow them to admit of such evolutionary theories.

Some believers in the Genesis record of creation have hinted at belief in stellar evolution, but have said little about it. The whole subject is one on which creationists are generally silent. Perhaps someday a creationist astronomer with sufficient knowledge of the details of the problem may be able to show the truth or error in the popular hypotheses regarding the origin of the solar system and the rest of the universe.

Chapter Fourteen

Searching for Ancestors

IN DEALING with the question of the origin of man it is necessary to understand where human fossils occur in the geological column. While some creationists have little faith in the geological systems, believing that they are arbitrary arrangements, yet it is coming more and more to be recognized that the fossil sequence does have a certain degree of validity and cannot be ignored.

Different systems of rocks, as generally believed, represent long ages of time, from the Precambrian, which is practically devoid of fossils, up through the fossiliferous rocks to the present. This interpretation challenges anyone who accepts the Biblical account of creation as referring to an event that occurred only a few thousand years ago, and to the Flood as a universal catastrophe. The creationist alternative to the popular view is that these systems represent, not ages of time, but stages of Flood action—the burial of the zones or habitats of the antediluvian world. This has been interpreted by Flood geologists as the theory of *ecological zonation*.

In the geological column the last great system before the modern one is known as the Pleistocene. It was in the period of the deposit of the Pleistocene rocks that the evidence of extensive glaciation on most of the continents was produced. The Pleistocene is commonly known as

the time of the Glacial Period. While most creationists now accept the concept of continental glaciation, a few are still critical of the theory. However, the available data seems to indicate that there was a time—either near the end of millions of years of geologic time or after the Flood—when there was a vastly greater accumulation of ice and snow in the mountains and on the northern plains of America, Europe, and Asia than is now existent. Anyone who is not clear on this point is referred for further study to *Fossils, Flood, and Fire*.

Most of the details regarding prehistoric cultures of Europe have been associated with the gravels along the rivers and the caves along their banks. The gravels were for many years attributed to the Flood, but in the early part of the 19th century Louis Agassiz, the Swiss naturalist, made extensive studies on glaciers. He observed that the same phenomena that could be seen in the Alps below the glaciers, extended far out into the valleys and onto the plains of Central Europe. In 1840 he published his *Etudes sur les Glaciers* (1), which convinced the scientific world that there had been a glacial period in the past.

Since the gravels along the European rivers were widely extended and minutely stratified, it was possible to work out a definite system of artifacts and skeletal remains. The levels higher up were the older, for they represented the early stages when the rivers were higher than at present. As the rivers cut down deeper and deeper into the gravels brought down from the mountains, they left suitable localities for more recent habitation. The present low levels represent the most recent.

After the sequences were worked out for Europe, attempts were made to correlate human prehistory in other countries with that of Europe, with varying degrees of success. Usually all that could be done was to correlate the pluvials, or times of heavy rainfall, with the stages of glaciation, and to develop a rough system of dating. Many difficulties lay in this method, with the result that the

dating of areas outside Europe are more or less uncertain.

If the glacial theory is correct the creationist faces a difficult problem. The Pleistocene is divided into four portions and is generally regarded as covering a period of a million years or more. Obviously this cannot be correlated with the Bible chronology. But it should be noted that some competent geologists have questioned whether there really were four distinct glacial epochs, as generally outlined, or whether they were merely phases of one major action. Also, the time element has been brought into question.

A study of the table on page 153 will show the four divisions of the Pleistocene in America and Europe. No human remains of any consequence have been found in America until the recent excavations at the Koster site in Illinois. The newsletter of the Koster expedition for April, 1975, makes the statement that the work in this area gives geologists the "longest profile of Pleistocene and Post-Pleistocene depositional history anywhere in Illinois." Hundreds of individuals, the report states, have been excavated from the mounds. But these throw no light on the question of the origin of man. That problem saw its inception in the Pleistocene deposits of the Third Interglacial. A few evidences of human occupancy have been found in Pliocene strata, but they are not sufficient to be of value.

During the Middle Ages many peculiar pieces of flint, much like arrowheads, were found. And even after the discovery of America, where the Indians were found to be using flint arrowheads, the faith of the Europeans was so strong with respect to a recent creation that they could not believe that what they were finding were really remnants of very ancient human occupation. They generally regarded these peculiar stones as thunderbolts or petrified iron implements.

In 1830 the Danish government created a commission to study the refuse heaps and shell mounds that were common in that country. This study produced a collec-

tion of ancient artifacts, which were kept at the Royal Museum at Copenhagen. In 1837 Christian Thomsen, Director of the Museum, proposed a chronology of human culture. He divided it into three parts—Stone Age, Bronze Age, and Iron Age.

During the 17th and 18th centuries, studies had been carried on regarding variations in mankind—the science of anthropology. In 1749 Buffon spoke of the likeness of man to the apes. In 1809 Lamarck, in his *Philosophie Zoologique*, declared that man had descended from the apes. During the early part of the 19th century, interest in human ancestry was at a high pitch, and anthropologists were eager to find evidence along this line.

The first discovery of ancient cave life was made in France and Belgium in 1833. At that time much road building was going on in France, and workmen were finding flint artifacts in the gravels along the rivers, especially the Somme. Boucher de Perthes, a custom official at Abbeville, near the mouth of the Somme River, became interested in these discoveries. In 1838 he presented to the scientific society at Abbeville his theory that these artifacts represented ancient human occupancy of the region. But when he published a monograph on the subject in 1846 his ideas were ignored. It was not until Lyell visited the area in 1859 that the significance of these discoveries was recognized. In 1863 Lyell, in his *Geological Evidences of the Antiquity of Man*, spoke of progressive development of man. With this, the science of prehistoric anthropology was under way. From this time on, as discoveries were made, the Paleolithic, or Old Stone Age, was systematized and elaborately subdivided.

In 1848 a human skullcap was found at Gibraltar. But no one had much idea of its importance, and not until 1856 did anything of importance occur in this field of study. In that year excavations in a cave beside the Dussel River in Germany exposed portions of a human skeleton. Since it was found in the Neander Valley, it was named Neanderthal man. From that time onward other fragments

of the same type have been found, until at present portions of about one hundred individuals are known.

Boule and Vallois, French authorities in anthropology, described the body of Neanderthal man as short, massively built, with a large head and well-developed face. The face was long, and above the eyes were prominent brow ridges, from which the forehead sloped backward, with a flattened skull. The lower jaw was chinless and the dentition was massive.

Anthropologists of that time regarded Neanderthal as a primitive species with archaic characteristics mixed with modern. Belief in the ape ancestry of man was so strong that it colored all descriptions. Recent studies, however, have modified this attitude. In 1955 two professors of anatomy, William L. Strauss, Jr., of Johns Hopkins, Baltimore, and A. J. E. Cave, of St. Bartholomew's, London, examined the La Chapelle remains, which have been generally regarded as the type specimen of Neanderthal. The skeleton, they stated, was "rotten with arthritis," and its effect on the joints was to give an unnatural stooped position. Most anthropologists recognize that Neanderthal was as upright as any modern man.

Much discussion has taken place regarding the origin of Neanderthal man. Many theories have been advanced, but probably too much stress has been placed on variations in anatomical structure. There is evidence of migrations into Europe in the early days, and these may have introduced changes in anatomical features. Actually, the variations noted are less than may be seen in the inhabitants of London today, and much less than among the Eskimos or ancient Egyptians. One authority has stated that they may have looked much like the American Indian.

At first there was a tendency to associate Neanderthal's receding forehead with small brain size, but the facts do not support that conclusion. The capacity of the skull varies from 1220 cc. to 1610 cc. with an average about the same as that of modern man. Some even say that the brain

was larger than that of moderns. (26:109) Most now agree that he was as intelligent as people of today.

Skulls of the Neanderthal type have been found as far east as Palestine and Mesopotamia and far down into Africa. But it is now believed that the true Neanderthals were limited to Western Europe and possibly part of Northern Africa. Those outside this range are generally spoken of as Neanderthaloids, which means "similar to Neanderthal." Most of the specimens of true Neanderthal have been found in Western Europe; Eastern and Central Europe are poor in remains.

In Palestine, associated with deposits dated as Wurm-I, Neanderthaloid specimens are common. They have been taken from six caves, and there appears to be a progression toward the modern. Remains at Skhul and Qafzeh in Israel, first regarded as Neanderthal, but now thought to be modern, are mingled with typical Neanderthaloid remains. (52:XVI:152) This mixture of primitive and modern features is puzzling. It is not easy to explain by migration; possibly it is due to mutations.

Several skulls have been found that raise questions as to early man in Europe. Three of these might be mentioned: Swanscombe, Steinheim, and Fontchevade.

The Swanscombe skull was found in the one-hundred-foot terrace of the Thames River. Artifacts associated with it were of the Acheulean industry, a very primitive type generally found below Neanderthal remains. (See Table 3.)

The skull found at Steinheim, Germany, was in the same level. It was typical Caucasoid, with a brain capacity of around 1300cc, and was modern in appearance. It was associated with Acheulean tools.

At Fontchevade in France the superficial layers of a cave yielded tools of the Mousterian culture. Below this level was a hard, limy crust, which seemed to be the floor of the cave. But this was pierced, and under it lay more than twenty feet of deposits in which, at a depth of eight feet, were found animal bones, stone tools, and fragments

of a skull. The animal bones included animals that belong to a warm, temperate climate—rhinoceros, deer, bear, and a wild dog now found in Southern Asia. Tools were of the later Paleolithic. The fluorine test showed that the bones were older than most Neanderthal bones.

When the skull fragments were assembled they showed some modern features. The French authorities claimed that the skull was of modern type, but others (8:68, 69) believe it is definitely Neanderthal. Several creationists have seized upon the French claim and have pointed out the impact it should make on the theory of the origin of Neanderthals by evolution.

On the other hand, Neanderthal, according to W. E. Le Gros Clark, should not be regarded as anything but *Homo sapiens*. He considers them a peripheral development from a race that was originally superior. Evidently these skulls, Swanscombe, Steinheim, and Fontchevade, may give indication of this earlier race—pre-Neanderthal, most likely.

During the latter part of the 19th century, as the hope of connecting Neanderthal with the ascent of man by evolution began to fade, search began elsewhere. About 1890 Eugene Dubois resigned his position as lecturer on anatomy at the Amsterdam University and enlisted in the royal Dutch East Indian Army in order that he might have the opportunity of searching for what he hoped might close the gap between apes and men.

The next year near Trinil, Java, he uncovered several animal bones on a river terrace. With them was one tooth that he thought might be that of an ape. Later he found a skullcap about a meter away. Further exploration turned up another molar and a left thigh bone about fifteen meters away. Putting all these together, he reported in 1894 the discovery of what he called *Pithecanthropus erectus*, the erect ape-man.

The skullcap was small, less than 1,000 cc. capacity, and had a distinct simian appearance. Some anatomists of the time regarded it as that of a gibbon. However, the

femur was like that of *Homo sapiens*. Much discussion arose, and it was many years before any general conclusion was reached. But as more finds were made in Southeast Asia and China, it was finally agreed that these specimens were apparently of a race of hominids that once inhabited that region.

At this point we pause to make clear what is meant by the word *hominid*. Since there is so much confusion in the public mind regarding the relation between men and monkeys, it will be helpful to give the presently accepted classification.

Order Primates—apes, monkeys, and man

Suborder Anthropoidea—manlike primates

Superfamily Ceboidea—New World monkeys

Superfamily Cercopithecoidea—Old World
monkeys

Superfamily Hominoidea—apes and man

Family Pongidae—apes

Family Hominidae—chimpanzee, gorilla,
gibbon, orangutan, and man

From this it should be clear that when an anthropologist speaks of a hominid he is not speaking of man, but of what he believes to be an ancestral type of apelike creatures that were on their way to becoming man.

During the years that followed Dubois' discovery much excavation was done in Southeast Asia, but the problem of the relation of the specimens to human evolution did not make much progress for a long time. Many explorers gave new genus names to their finds, adding confusion to the matter of classification.

In 1929 a skull was found at Chou-k'ou-tien, near Peking. This so interested the Geological Survey of China and the Rockefeller Foundation that fifty to one hundred technicians worked the surrounding region for ten years. Fourteen individuals were recovered, a large fauna, and two thousand crude stone implements.

The deposits at Chou-k'ou-tien consisted of several layers. At the top was a cave crammed with animal

bones—hares, bears, hyenas, tigers, deer, cheetahs, and ostriches. Several skeletons of man were found in the cave, but only three of them were described. They were all lost during the war between Japan and China. There were hearths at different levels, with evidence that fires were kindled and stones dressed.

These remains were named *Sinanthropus*, China man. The cranial capacity varied from 850 cc. to 1300 cc. This, it is said, is within the range of human skull capacity, although somewhat on the smaller side. All the limb bones were indistinguishable from human bones. In some deposits were crude cores and trimmed flakes of quartz and other stone. This would indicate a certain degree of intelligence not possessed by an ape.

The close relationship of *Sinanthropus* to *Pithecanthropus* has led many scholars to discard the former names. Detailed study has led to the conclusion that *Sinanthropus* and *Pithecanthropus* are not generically distinguishable from *Homo*. Therefore the names first given to these specimens have been replaced by *Homo erectus*. This seems to be the attitude of the most recent publications, although not all anthropologists agree fully.

The Paleolithic culture of China resembles that of other parts of the world. The artifacts are the same—Mousterian cores, points, etc. Other finds in Japan and China indicate advanced culture, many of the specimens being well within the range of modern man.

In 1890 when Dubois started his work in Java, he found a skull at Wadjak that was large, like that of modern Australian aborigines. He kept it under cover for 30 years, possibly because he could not make it agree with his theories of ancient man.

Much more might be said of Southeast Asia and China, but enough has been said to show that the question of the origin of man in that part of the world has many pitfalls. Many theories have been proposed to explain the relation between pithecanthropoids and other primitive peoples, but these theories do not do much to

solve the problems. And for the creationists the whole question is baffling. If these were not hominids, that is, creatures advancing toward mankind, what were they? This point will be discussed later, after we have considered the more recent discoveries in this field.

The impasse in Asia was relieved when a discovery in South Africa focused attention in another direction. In 1924 Raymond Dart, Professor of Anatomy at Witwatersrand University, Johannesburg, South Africa, found a skull embedded in a calcareous tuff quarry eighty miles north of Kimberley, Botswana. He believed it to be the skull of a young ape, about six years old, and named it *Australopithecus africanus*, the Southern Africa ape.

The specimen consisted of part of the skull with a well-preserved face. The features were described as ape-like, with a slanting forehead and a low cranial vault. The face looked like that of a chimpanzee. However, several features resembled those of man, and the posture was believed to be upright, judging from the shape of the occipital bones.

Much dispute arose as to whether this was an ape or a human being, and an acute controversy raged for many years. Later workers found more fragments in sites near Johannesburg—at Sterkfontein, Kromdraai, Swartkrans, and Magapansgat. Approximately 100 individuals were represented. (52:11:813) However, the fragments were so scattered that it was impossible to tell to which individual many of them belonged. One writer says they were like the bony refuse of a lamb stew, and consisted largely of teeth.

Coon (36:235) says that the finds were small, about the size of pygmies. But, he asserts, the group as a whole was no more variable than any living chimpanzees. They were doubtless variations in a single group, and not distinct species.

The middle of the century came—a hundred years after the discovery of the first fossil man—and anthropologists thought they had the matter pretty well worked

out. *Australopithecus* was the oldest hominid, and those remains that appeared to be more “advanced” were put into the group *Homo erectus*. This type has been found in sites all over East and South Africa, West Africa, Western and Central Europe, and Southeast Asia. Just what was the relation between African and Asian *erectus* is not fully agreed upon. Some think that there may have been multiple origins of the human race; most, though, hold to the idea of a single ancestral line, even though it is not clear what that line might have been. Neanderthal was an offshoot from fairly modern man that migrated outward from Asia Minor. This was the essence of most anthropology writing at midcentury.

And what did the creationists think about it? A great many of their comments were of the nature of ridicule or complete disbelief in the validity of any of the evolutionary interpretations, even though they could produce no sound evidence against them. A few dealt with the problem in a matter-of-fact manner. Coffin made the following comment: (34:216)

“Could these remains represent primitive and degenerate human beings who wandered away from the centers of civilization, lapsed gradually into a crude and degraded social and economic culture that included cannibalism? The bashed-in skulls of these finds in Africa, Java, and China all indicate this possibility.”

He did not, however, believe the *Australopithecines* were human. He said:

“There is little doubt that the *Australopithecinae* comprise a varied group of apes, but they do show man-like characteristics not seen in modern apes.” (34:214)

Two other writers, writing at later dates, Duane T. Gish (61) and Henry M. Morris, (108:173) express similar views.

In these various interpretations one can see a bit of subjective thinking. Evolutionists see in the similarity of the bones of the *Australopithecines* to human bones an evidence that they were hominids—animals on the way to

becoming man. On the other hand, creationists see in them a perplexing problem. They are so near like the apes that it is difficult to imagine them as the result of degeneracy; therefore they must be classed on the animal side. The latest theory put forth by the anthropologists, which places all of the slightly more "advanced" specimens as *Homo erectus*, still does not settle the question of what they really were. As yet there is no consistent agreement on the subject that the creationist can lay hold on.

The matter might have been left in this unsettled situation were it not for some startling discoveries made since 1960. These will be discussed in the following chapter.

CHRONOLOGY OF THE PLEISTOCENE AGE AND RECENT MAN

GEOLOGIC AGE				CULTURAL STAGES		FOSSIL MEN					
AMERICAN RECENT				EUROPEAN RECENT		IRON		HOMO SAPIENS	MODERN		
										BRONZE	
										NEOLITHIC	
						MAGDALENIAN					
PLEISTOCENE	UPPER	WISCONSIN GLACIATION 3D. INTERGLACIAL	WURM GLACIATION RISS-WURM INTERGLACIAL	PALEOLITHIC	SOLUTREAN	AURIGNACIAN	CRO-MAGNON				
	MIDDLE	ILLINOIAN GLACIATION 2D. INTERGLACIAL	RISS GLACIATION MINDEL-RISS INTERGLACIAL		MOUSTERIAN	ACHEULEAN		CHELLEAN			
									LOWER	KANSAN GLACIATION 1ST. INTERGLACIAL NEBRASKAN GLACIATION	MINDEL GLACIATION GUNZ-MINDEL INTERGLACIAL GUNZ GLACIATION
	SINANTHROPUS										
						PITHECANTHROPUS					
						AUSTRALOPITHECUS					
PLIOCENE				EOLITHIC							

Chapter Fifteen

Shock Waves in Anthropology

LOUIS S. B. Leakey was the son of a missionary family in East Africa. While attending Cambridge in the 1930's he declared in an anthropology class that he believed that man arose in Africa. He was laughed to scorn but he persisted in his views. He returned to his home and threw himself so ardently into the study of the life of the region that he eventually became the curator of the National Museum at Nairobi, Kenya. From there he and his wife, Mary, conducted a search for prehistoric man.

Leakey selected the Olduvai Gorge, 327 miles away in Tanzania, as the most likely place to find what he was looking for. Here two volcanoes had blown out ashes that, with gravel from the surrounding hills, had filled a lake during what geologists claimed was a million years of action. For thirty years the Leakeys dug in the gorge that water had eroded through the lake bed. So many specimens of ancient animals and plants were found at different levels that Olduvai became known as the "Grand Canyon of evolution."

Mary Leakey was a digging expert; she worked with her husband day after day in the blistering heat of the African sun. They spent weeks on some digs, and found the bones of 150 species of animals. Some crude tools were uncovered, and Leakey demonstrated how these

must have been formed by some intelligent creature. But for thirty years no human remains showed up.

On a July day in 1959 Louis was ill in his tent, and Mary was searching the floor of one of the levels of the gorge. Suddenly she saw what looked like human teeth. Stooping down, she brushed away the soil and exposed a jawbone with teeth. She jumped up, ran to the tent, and shouted, "I found man!"

In spite of his illness, Leakey jumped out of bed and ran to the spot. Then he set his crew to digging. In nineteen days they accumulated more than four hundred fragments of bone. When assembled, these made a very peculiar-looking skull. The Leakeys took this to the University at Johannesburg, where their friends Philip Tobias and Raymond Dart examined it. They were jubilant over the discovery and declared it represented "the oldest human ever found." Their faith was supported when a sample of the soil in which the skull was found was sent to New York and, tested by the potassium-argon method, came up with a reading of 1,750,000 years.

Leakey named his discovery *Zinjanthropus boisei*. The genus name means a man of East Africa. He was sure it was human or near-human. The specimen had a most unusual appearance, with a high face, and a forehead that sloped backward sharply from the brow ridges over the eyes. The face was apelike in some respects, particularly in its flatness, but human in other features. There was no lower jaw, although in artists' illustrations they supply what they imagine the jaw must have looked like. The teeth in the upper jaw were indistinguishable from those of *Australopithecus*.

Many anthropologists were shocked when they heard the date of 1,750,000 years for this specimen. This was about a million years older than most other remains of fossil man had been dated. If this was a man indeed, how could he have existed so long before the very creatures from whom man was supposed to have arisen—the *Australopithecines*?

The National Geographic Society became interested in Leakey's work and sponsored further digging. Massive excavations revealed many more animal bones and many tools—at least what looked like tools, chipped from pieces of stone.

A year later another surprise came. A portion of a skull was found in the same layer with *Zinjanthropus* and a few feet below it. This was described as modern in configuration, with modern teeth. Later several other specimens of the same kind were found. Leakey named them *Homo habilis*.

Now the anthropologists had a real problem on their hands. They had three types of hominids, *Zinjanthropus*, *habilis*, and *erectus*. And there was the question of who made the tools found in the gorge, which incidentally, were skillfully done. Weapons, scrapers, and cutting tools were made from lava. (55:75)

For a while the status of these finds was a matter of spirited debate. Among the experts some agreed with Leakey that *Zinjanthropus* was near-human; others vigorously disagreed. Intensive study was given to the specimens, with the eventual decision that both *Zinjanthropus* and *Homo habilis* were merely variants among the Australopithecines. How much subjective thinking went into this decision is impossible to say, but at any rate the theory of man's origin seemed to be at rest for the time being.

Louis Leakey's son Richard grew up in the field of anthropology and followed in his father's footsteps. He became interested in the wild, steep country near Lake Rudolf in northern Kenya. There, in sedimentary material 2,000 feet deep and well stratified, many bones of Australopithecines were being uncovered. One day as he arrived at the excavation site, Richard's chief deputy handed him a bag of bones, remarking that he might find them of interest. Leakey took them home and tried to assemble them. But they were too few, so he set his crew to work searching for more. After six weeks they had

enough to make a complete skull.

When assembled, the skull, known only by its museum number 1470, showed no brow ridges like others in the region. It was nearly as large as those of *Homo erectus*—800 cc.—and had a distinctly modern appearance. A shock of consternation passed through the anthropological world when tests indicated an age of nearly 3 million years. Scientists were perplexed.

For years Leakey had been finding specimens of *Australopithecus*. In his 1970 expedition to Lake Rudolf he found 16 specimens, bringing the total to that date to 23. There were mandibles, craniums, femurs, humeri, and tibiae. It is important to note that they were not skulls only. Too often erroneous conclusions may be drawn from skulls only, whereas more accurate information may be obtained if more of the skeletal features are known.

These materials were complementary to materials from other East African sites, all relating to the Australopithecines. At a major site at Koobi Fora on Lake Rudolf, 60 stone tools were found, including chopping tools and flakes. Tests gave an age of 2.6 million years. Some investigators in the Rudolf region obtained dates of as much as 4 million years. Like dates were obtained on some Ethiopian specimens from not far away.

Other expeditions in the region unearthed femurs and fibulae. Some of them were described as “advanced hominids.” The teeth of a fragmented skull of a child dated the same as 1470; they were not Australopithecine. In four months 35 hominids were found.

Australopithecines and hominids were contemporaneous, Richard Leakey concluded, and there was no evidence that they were in any way related. That would place modern-looking hominids along with more primitive creatures as much as 3 million years ago. The idea that the Australopithecines were ancestral to *Homo* must be carefully reviewed, he asserted. Some listeners were skeptical and objected to such radical change in anthropological theory. But Leakey maintained his position, saying that

"Either we toss out his skull," speaking of 1470, "or we toss out our theories of early man." (84) The whole background for the origin of man from the Australopithecines was put in doubt by these discoveries, and new theories are being worked out so as to allow for the origin of man from an independent, unknown ancestry, simultaneously with that of the Australopithecines.

Many more reports might be cited, but the import of them all is the same: These discoveries throw more emphasis on the question, Who were the Australopithecines? If they were not ancestors of modern man, who were they, and where did they go?

Dart, in his discussion of the Taungs cave, states that its contents were a midden heap—a comminuted breccia of bones of birds, reptiles, mammals, etc. In another cave, in the Magapansgat Valley, Australopithecine skulls were found to be fractured, but there was no evidence of stone tools. (42) In a revision of his report for the Smithsonian Institution, Dart said that stone tools were found in the upper layers, and an Australopithecine jaw in the same layers in 1955. During the next two years a similar discovery of stone tools accompanying Australopithecine remains was made at Sterkfontein. Dart claims to have examined thousands of small bone flakes and antlers split to make flakes. This, he said, "proved conclusively that the shaping of tools had become a regular feature of later Australopithecine life." Other workers are skeptical of Dart's conclusions. In Kenya no stone tools were found except where *Homo erectus* has been found.

W. W. Williams points out that Java man has been named as *Homo erectus* and Peking man is only a subspecies, *Homo erectus pekinensis*. But the question arises, Where did *erectus* go? Williams could offer only meager evidence. At Vertesszollas, Hungary, a single occipital bone was found in 1965, of such a shape that it was considered belonging to *erectus*. On this basis it was suggested that the line goes to Swanscombe and Steinheim in Europe and at a later date to Neanderthal.

"After all," Williams remarked, "the nature of the line leading to living man . . . remains a matter of pure theory." The discoveries of Richard Leakey six years later merely emphasize the significance of those words.

Now with *Australopithecus* and *Homo erectus* eliminated as man's ancestors, where did *Homo sapiens* come from? In his report of skull 1470 Richard Leakey notes that a skull found in Kenya, named *Kenyapithecus*, shows some likeness to *Homo*. But it is dated at 14 million years ago. That leaves a gap of 10 million years between it and the specimens found at Lake Rudolf and in Ethiopia. The line is a very thin one, to say the least.

The question still lingers, Who were the Australopithecines? The present trend is toward recognizing them as hominids rather than pongids. The Encyclopaedia Britannica (112, 31) lists as many as seven features in which these remains resemble the hominid line more than the ape line. A recently published *Atlas of Fossil Man* (8) gives drawings of all the principal skulls and analyzes their relations. The statement is made (p. 20) that it now appears likely that all of the Australopithecines were in a single line. While there has been pronounced variation, it does not imply more than one genus and species. The variation is no more pronounced than in more recent hominids. As one author states, the evidence is "totally inadequate" for tracing the transformation of African culture. (19:371)

Generally, creationists are satisfied to accept the situation as it is, noting the perplexity that faces the evolutionary viewpoint regarding the origin of man. But the case does not need to rest there. There is another aspect of the problem. Anywhere we go through Africa, Europe, and Asia we find higher cultures above the Paleolithic. What do these have to say about early man. Did civilization arise from a substratum of Paleolithic (Old Stone), Mesolithic (Middle Stone), and Neolithic (New Stone) ages? Is the sequence of Stone, Bronze, and Iron ages accurate? And if so, what does it mean, in terms of the

Flood theory of geology?

The report of the University of Chicago Oriental Institute on exploration in the Upper Nile and Nubian region says that at the close of the Pleistocene glacial "epoch" Egypt was a land of copious rainfall. The hills surrounding the Nile Valley were forested. Herds of wild animals were abundant everywhere. The plain was an extensive swamp or lake. Surrounding the valley are three distinct terraces, and on these have been found many flints, indicating that Neanderthal man dwelt there. In Upper Egypt the Paleolithic deposits disappear beneath the river bed, showing that it had silted up after the first inhabitants had been there. (137)

Early man preferred the edges of the valley. The Paleolithic man disappeared, and Neolithic man came into the valley before it had reached its present levels.

Egyptian urban culture, says Turner (160:177), began with the Neolithic, and was immediately succeeded by a culture that knew the use of copper. The same was true, he says, in Greece (p. 214). Farther south, in Kenya, the same succession of Stone Age cultures has been found as in Europe and Egypt.

Excavations at Tepe Gawra in the Mesopotamian Valley gave one of the most complete sequences known to archeology, with 26 levels of deposit. The lower level was Neolithic, but the artifacts of other levels were largely of metal. (153)

At Ur, the city of Abram, copper, gold, and electrum (gold and silver alloy) were found. Other nearby cities showed numerous copper vessels mingled with flint implements. In the earliest tombs of the kings of Ur were gold instruments, beautifully decorated. It appears that in all these early civilizations gold was abundant. Chariots were decorated with red, white, and blue mosaic, and with golden heads of lions having massive manes of lapis lazuli on the side panels. Among the other discoveries were gold heads of lions and bulls, silver lionesses, saws of gold, copper vessels, silver vessels, all beautifully

done. In some of the tombs at al Ubaid were found lovely copper and jeweled vessels.

In 1899 A. H. Sayce, an outstanding authority on archeology, made the following statement:

"The history of the ancient East contains no record of the development of culture out of savagery. . . . So far as archaeology can teach us, the builders of the Babylonian cities, the inventors of the cuneiform characters, had behind them no barbarous past." (139:270)

Conservative Bible students took comfort from these words, and inasmuch as Paleolithic habitations were little known anywhere except in Europe, they felt that Biblical chronology was not in any peril from the rising anthropology. However, in recent years explorations in the Middle East have revealed many Paleolithic sites. Most of them were crude, consisting of hearth fires or circles of stones that apparently were used to hold down the edges of tents or other crude shelters. Then came discoveries regarding Neolithic sites, and these have opened up a new vista upon the course of human prehistory.

The earliest settlements were in the hills surrounding the marshy valleys, and it is there that most of these Paleolithic discoveries have been made. As soon as the valleys became habitable, men began the building of cities. Perhaps the most important of all these early settlements was that of Jericho. Kathleen Kenyon has given us much information regarding this ancient city. (77)

Jericho is generally regarded as the oldest city in the world. The town was surrounded by a massive wall, with one or more round towers. Around the wall was a wide moat. Most of the stones in the wall were carried from the foot of the hills a mile away, by what mechanical means we do not know. But the tools used in excavating them were made of flint, bone, and wood.

As to the tools, there were many varieties and sizes. Blades served as knives. Other tools were used for manufacturing garments from skins. Arrowheads were abundant. Sickle blades, with finely serrated edges, were used

for cutting grain. Querns, or grinding stones, give evidence of the use of grain. There were adzes and axes for woodworking, and picks and hoes for working the soil.

The buildings were well constructed, mostly of bricks. The floors were of clay, and finished with a fine lime plaster, which is still very hard. The floor surface was carried up the face of the wall, so that there were no sharp corners to collect dirt. The roof seemed to have been made of mud and reeds, as judged by reed-impressions found in the fallen debris. It is estimated that about 3,000 people lived in Jericho.

Jericho must have carried on trade, for in the ruins were found tools made of obsidian from Anatolia, lumps of turquoise from Sinai, and cowrie shells from the Mediterranean shores. It seems likely that, being near the shores of the Dead Sea, they might have obtained salt and bitumen for trade.

On the Anatolian Plateau, which is the Asiatic part of Turkey, is a region that has long been regarded as a barbarous fringe of the Fertile Crescent, but has now been established as the most advanced center of Neolithic culture in the Near East. (89:77) While the valleys of the Nile and Tigris-Euphrates were still marshy, the Anatolian-Iranian Plateau was parklike and well fitted for life. Paleolithic and Neolithic artifacts have been found everywhere throughout the region, and the sequence is the same as that of Europe.

One of the most extensive excavations anywhere has been made on the site of Catal Huyuk, located in two riverside mounds that cover 32 acres on the plain north of the Taurus Mountains. (88) The buildings were made of sun-dried bricks, reeds, and plaster. Much straw was used in their construction, and black mortar held the bricks together. They were plastered on the inside and out with tenacious white clay, which has been well preserved.

The buildings occur in twelve different levels throughout a depth of 55 feet. They are closely packed, with no doorways, but were entered by the use of ladders

leading to the roofs. Inside are remarkable wall-paintings and plaster reliefs and sculpture in stone and clay. There is evidence of advanced technology in weaving, woodwork, metallurgy, and obsidian working. Agriculture was well advanced, as was stockbreeding, and there was a flourishing trade in raw materials. It is now believed by archeologists that civilization began on the plateau and not in the lower valleys.

As to agriculture, barley, lentils, peas, and wheat were raised, and almonds, acorns, pistachios, apples, juniper berries, and hackberry have been found; they were brought from the mountains or were cultivated. Sheep were raised, and possibly some cattle, but whether the pig was domesticated has not been confirmed.

The stone industry reached its climax here. Obsidian spearheads as much as eight inches long have been found, and arrowheads, daggers with handles of bone, and many other tools, such as adzes, axes, and chisels. Many bone utensils were used—cups, scoops, ladles, and many others. Shells and bone were used in necklaces, armlets, bracelets, and anklets. Polished obsidian mirrors were made but how the brittle stone could be polished is not known.

There is evidence of basketmaking, the use of rush carpets, and the weaving of fine cloth. Animal skins were used for clothing, also. Trade must have taken place, for many pieces of stone have been found that are unknown in the region, such as rock crystal, carnelian, jasper, and chalcedony.

All in all, this site has yielded a wealth of material unrivaled by any other Neolithic site. It presents a picture, not of civilization emerging from savagery, but of a well-developed civilization very, very early in human occupancy of the region.

Evolutionists *assume* that primitive man was emerging from savagery—from an animal ancestry—and that it would take him thousands of years to reach a state of civilization. On the other hand, creationists see man as an

already intelligent creature, capable of making rapid advances in the use of natural resources. Perhaps it is worth noting that the reports speak of the "spectacular development" in some of the sites excavated. To this the creationist fully agrees.

But what about the use of stone tools? If, as appears to be true, all the civilization of the Near and Middle East was underlaid by a period of stone tools, how can this be fitted into the idea that man was already an intelligent being? Did not Noah and his sons know the use of metal tools when they built the ark? Tubal-cain worked with brass and iron (Gen. 4:22).

The reply of the creationist has been that as man wandered out over the rugged earth left by the Flood, he had to use whatever materials he could find. The most easily worked materials for making tools and utensils would be flint, limestone, and obsidian. As we have seen, when the stone artifacts reached the Neolithic stage, the culture passed rapidly, or "immediately," as some reports say, or "spectacularly," into the age of metals. In some areas gold and silver were the first metals to be worked. Copper was about the next easiest to smelt and fashion into tools. But these were all soft, comparatively, and when it was possible to make bronze by combining copper and tin, much better tools could be made. That is doubtless why the bronze age is so important in ancient history. Next came the use of iron, which continues still to be one of the most important of all metals.

The question of the origin of civilization is much in dispute. The conclusion any person will reach will depend on his background of theory. If he is an evolutionist, he will consistently picture a long period of thousands of years for the rise from savagery. But if he is a creationist, he can orient his view of history to the background of the Genesis record and a short chronology. And this is where we must leave the question of the ancestry of man for the time being.

Chapter Sixteen

Challenges to Evolution

ONE of the most spectacular clashes between evolution and creation took place in Dayton, Tennessee, in 1925. The Tennessee legislature had enacted a law to the effect that it should be unlawful for any teacher in any of the public schools of the state to teach any theory that denies the story of creation of man, and to teach that man has descended from animal ancestry.

Local residents of Dayton persuaded John T. Scopes, science teacher at the high school, to have himself arrested for violating this law. As soon as this became known, newspapers around the country publicized the coming trial. The American Civil Liberties Union agreed to finance the trial, and retained Dudley Field Malone and Clarence Darrow, noted attorneys, to defend the accused. William Jennings Bryan, world-famous orator and statesman, was engaged to prosecute the case.

How much the famous trial was really a trial of Scopes and how much a contest between evolution and creation on their respective merits, is shown by a surprising statement made by Scopes himself in a book he wrote. (143). "I didn't know enough about evolution to lecture on it," he wrote (p. 193). "To tell the truth, I wasn't sure I had taught evolution" (p. 60). He said that on the day in question he had been absent from his class. He had often

missed classes to coach in athletics.

Malone and Darrow were at Dayton not so much to defend Scopes as to fight the law and show that it was unconstitutional. A large number of scientists, college and university professors, were called to give expert testimony in favor of evolution. They were nonplussed when the judge ruled that the question was not as to whether evolution was true or false, but simply whether the law had been violated by Scopes. In spite of this ruling, however, a mass of scientific testimony was presented and published to the world.

Bryan had a good classical education in addition to his law course, but he was profoundly ignorant of the science of geology. It became very easy for a trained lawyer like Darrow to hold him up before the newspapermen as an ignorant bigot. And since Bryan claimed to represent the Bible and its teachings about the origin of the earth, Biblical Christianity was made to look ridiculous.

With respect to Bryan, George McCready Price, in reviewing the Scopes case in *These Times*, of Nashville, Tennessee, in the issue of February, 1960, stated the situation as it appeared to him thirty-five years later. He said that Bryan had been lecturing all over the United States, giving his fundamentalist views regarding evolution and related topics. But Bryan's lectures were more like Sunday morning sermons than scientific discussions.

The trial opened on Friday, July 10, 1925, and the jury was selected. When the court opened again on Monday, it was with a prayer by a local clergyman that God would defend His Holy Word against its enemies. A strong religious bias was thus introduced into the proceedings. For a week verbal pyrotechnics continued, with scientific evidences for evolution being presented by the lawyers defending Scopes, and impassioned oratory by Bryan in favor of the Biblical view of the origin of the earth and its life. Bryan's case was made to appear very weak when he was forced to confess that the days of creation might have been millions of years long. Although his testimony was

not allowed to go to the jury, it was seized by the press and broadcast world-wide.

Finally the jury was instructed by the judge to deal with the case strictly on the question of whether or not the law had been violated. It returned a verdict of guilty, and Scopes was fined \$100. On appeal to the state supreme court, the verdict was upheld, but the fine was thrown out. The case was dropped.

Religious journals all over the world discussed the case. Price, who was teaching at a college in England, gave a summary of the scientific aspects in the *British Review of Reviews* of August 15 and September 15. We give a brief digest of his articles:

What are the reasons, he asked, why many well-educated Americans were willing to discard a theory that had been long accepted? Thousands of people with college and university educations were very positive in repudiating organic evolution. (One wonders whether or not Price had overestimated the influence of his anti-evolution crusade.) Evolution, he declared, is based on two ideas, (1) the serial arrangement of the fossils, which are supposed to have been laid down through long ages, and (2) the origin of higher categories of life from lower forms by natural selection and other processes. These ideas, he claimed, have proved faulty, and evolution was being termed by certain leading scientists as merely an "act of faith."

He then proceeded to elaborate on the biological and geological aspects of evolution, and to give his views regarding scientific data that could be used to discredit it.

Most of the discussion of the trial, aside from newspaper reports, was by theological writers, who dealt largely with the question of the origin of man. A few gave more attention to the scientific aspects of the court testimony. In two articles in *The Watchman Magazine*, for September and October, 1925, respectively, I asked, "Are Anti-Evolution Laws Blocking Progress?" and "Is a Creationist an Ignoramus?" A survey of "expert testimony"

given at the trial evidenced an attempt to coerce people to follow human theory, which might be contrary to the Word of God in regard to the origin of the earth and life on it.

Public interest in the question soon faded out, and the general conclusion seemed to be that evolution had triumphed. The case was soon forgotten, and the surge of creationist fervor it awakened was lulled to sleep to await stimulation at some future date, when a new challenge might arise.

The years since the Scopes trial have seen a number of attempts to form organizations to combat evolution and promote the cause of creationism. Some of these have been successful, and some not so much so, and some have faded out entirely.

In 1935 an attempt at such an organization was made by D. J. Whitney, a farm journal editor of Exeter, California. For several years he published a mimeographed sheet called *The Creationist*. A paper of this same name is still being published by the Christian Evidences League of Malverne, New York.

A teacher in Wheaton College near Chicago, Illinois, L. Allen Higley, organized what he called the Religion and Science Association. He was president, George McCready Price was given the position of Director of Research, and Whitney was secretary-treasurer. Plans were made for publishing books, organizing study groups, etc. But in time a clash came between Higley, who advocated the "ruin-and-restitution theory," and Price, who could not accept it. Eventually the plan was abandoned.

When George McCready Price retired from teaching and settled in Pomona, California, he took an active part in the Deluge Society which B. F. Allen had been instrumental in developing. This society published a Bulletin for several years.

In 1942 the science teachers of Seventh-day Adventist colleges meeting at Washington, D.C., formed the Asso-

ciated Nature Clubs. Under this organization there were set up many local nature clubs, some of which are active today. For nearly 25 years the Association published the *Naturalist*. One of its features was the publication of articles on the literal interpretation of Genesis. While the circulation was not large, about 2500, it did keep alive an interest in creationism.

In 1958 leaders of the Seventh-day Adventist Church, realizing that they needed to have research done on problems in the scientific fields of biology and geology, set up the Geoscience Research Institute, with Frank L. Marsh as Director. Marsh had had a long career of teaching and research and had written several books on the subject of evolution and creation. (91, 92, 93) His book *Variation and Fixity in Nature* deals with recent discoveries in the field of changes in species, and is a powerful argument on the side of creationism. Marsh has also contributed many articles on the subject to religious journals.

Richard M. Ritland, from Loma Linda University, and P. Edgar Hare were also on the staff. When Marsh retired, Ritland became Director. A number of others were later added—Harold G. Coffin, Edward Lugenbeal, and Harold James. From 1970 to 1972 Ariel A. Roth, head of the Biology Department of Loma Linda University, was acting Director. He was followed by R. H. Brown, who has been an authority for many years in the field of radiometry.

Extensive field studies have been in progress, and while no reports on these projects are as yet available, information is being accumulated that promises to be highly favorable to the cause of conservative creationism. Field tours have been conducted for science and religion teachers in Adventist colleges, and to acquaint church leaders with the problems related to creation and the Flood. So far two excellent books have been produced by members of the staff: *Creation, Accident or Design?* by Harold G. Coffin, (34) and *The Search for Meaning in*

Nature (134) by Richard M. Ritland.

In 1974 the Institute began publishing a journal under the title *Origins*. This journal aims to maintain the highest standard of scientific integrity in articles that show how the data from the physical and life sciences may be harmonized with Biblical creationism.

One group that has had considerable influence is the American Scientific Affiliation, previously mentioned. Its purpose was to establish scientific support for the creation record of Genesis. However, some leaders of the Affiliation accepted the theory of long ages of geologic time and, in order to harmonize this idea with creation, swung over to theistic evolution. Affiliation publications now include viewpoints of liberal theology concerning the validity of the Bible. While many conservative creationists still retain their membership, it is obvious that the organization has changed from its original purpose.

Walter E. Lammerts, the renowned rose breeder, ran across a copy of Price's *New Geology* while he was a student at the University of California. He was much impressed by it, and for a number of years carried on correspondence with Price.

Lammerts continued to be concerned about the teaching of evolution in the public schools. In 1963 he started correspondence with a number of scientists that he knew were interested in the problem. After a meeting of the American Scientific Affiliation in Wilmore, Kentucky, late in 1963, he and several others went up to Michigan and organized the Creation Research Society. Lammerts was elected president, which office he held for about six years. He was also editor of the *Quarterly*, published by the Society, for five years. In a personal letter, Dr. Lammerts stated:

"It all started because my daughter kept telling me that in school their biology teachers kept telling them that *all* scientists believed in the evolution theory. So I began to wonder if I was the only unenlightened one."

In order to become a voting member of the Creation

Research Society, a person must have a degree of Master of Arts, or higher, in a natural science, and must sign a declaration, portions of which are given below:

"1. The Bible is the written Word of God, and because it is inspired throughout, all its assertions are historically and scientifically true in all the original autographs. . . .

"2. All basic types of living things, including man, were made by direct creative acts of God during the original Creation Week described in Genesis. . . . Changes . . . since Creation Week have accomplished only changes within the created kinds.

"3. The . . . Noachian Flood was an historic event world-wide in its extent and effect."

Lammerts hoped that he would find at least 50 scientists who would agree with him and join the Society. But the latest information is that there are around 500 regular members, and 1200 who have signed the declaration but do not qualify academically. This shows the falsity of the claim that no scientist believes in the Genesis account of creation and the Flood.

The *Creation Research Society Quarterly* contains articles contributed by scientists and by others who believe in the Genesis record. The Society is strictly non-sectarian, with members from many different church groups.

One of the outstanding efforts of the Creation Research Society has been the publication of a high school biology textbook, which is free from all evolutionary implications. This text, *Biology: A Search for Order in Complexity*, (96) made a spectacular sale during the first few months of its appearance. It was the result of four years of effort, with a writing staff of twenty-four members. John N. Moore and Harold L. Slusher were co-editors.

Another very active enterprise is the Bible-Science Association, directed by a Lutheran minister, Walter Lang, of Caldwell, Idaho. In 1964 this Association was

incorporated as a tax-exempt organization in the state of Idaho, and began printing a monthly *Newsletter*. A personal letter gives the following information regarding the Association:

"This is an independent organization seeking to reach not only the churches in general but also the entire educational world. So we call ourselves an educational and a religious group. We do not restrict membership to any religious groups, but we do ask membership to subscribe to what we have on the masthead of our *Newsletter*. What we prefer is for members to work as much as possible in their own churches, and then merely let us know what is going on so that we can supply information to everyone as to what is going on. . . .

"We feel that we have a conscientious right to work with religious groups that might differ from us personally. . . . We feel that we need creation to have common morality, to have the highest in civilization, the best in statesmanship, and the best in our courts. We feel especially that our educational system is an inferior system, even from a secular viewpoint, if it does not have creation. And for this reason . . . we feel that we can conscientiously work together with people who may not agree with us doctrinally."

This is not a research organization, but exists solely for publicity and promotion. The director travels continually, lecturing and assisting in Creation Seminars throughout the country. The monthly *Newsletter* contains news items and articles on creationism by various writers. The head office at Caldwell, Idaho, is a distributing center for the most complete line of creationist literature to be found anywhere.

About forty years ago Captain Bernard Acworth, of England, wrote a number of articles against Darwinism, setting forth its devastating effects in all fields of human relationships. These articles were later embodied in a book, *This Bondage*, published in 1929. The book brought Captain Acworth into contact with a recognized

ornithologist, Douglas Dewar, who was also opposed to Darwin. A series of lectures caused considerable public interest in the problem of evolution, and in 1932 the Evolution Protest Movement was organized. Sir Ambrose Fleming was elected President, and Douglas Dewar Secretary-Treasurer.

Dewar was the mainspring of the campaign, and for the rest of his life he worked tirelessly on its behalf. He was elected President of the Movement in 1946, and later Acworth took over the office. At present the President is Sir Cecil Wakeley, a prominent English surgeon. The Movement has branches in Australia, New Zealand, South Africa, and the United States.

One of the most active of recent developments in the field of creationism is the Institute for Creation Research in San Diego, California. Affiliated with the Christian Heritage College, a Baptist institution, the institute was originally designated as the Christian Creation Research Center. The director is Henry M. Morris, co-author of *The Genesis Flood* and former president of the Creation Research Society.

One of the most interesting developments in recent years has been taking place in the California elementary school system. For some time members of creationist groups have been insisting that it was not fair that pupils should be taught only one view of the origin of the earth and its life. When the new Science Guidelines were presented to the State Board of Education for approval in 1969, three members of the Board objected to the statement about evolution. It read: "The oldest explanation [of origins] is a religious one, that of special creation." This was revised, and replaced by a new statement, part of which follows:

"All scientific evidence to date concerning the origin of life implies at least a dualism or the necessity to use several theories to fully explain relationships between established data points. . . .

"While the Bible and other philosophic treatises also

mention creation, science has independently postulated the various theories of creation. Therefore creation in scientific terms is not a religious or philosophic belief."

The Department of Education passed rulings to the effect that when texts on science were presented for adoption in the summer of 1971, they must contain statements of both the creationist and the evolutionist interpretation.

Of course, there was a violent reaction from many evolutionists. The pastor of Grace Cathedral in San Francisco gave a bitter attack on the ruling of the State Board. As a result of the storm of protest that was stirred up by this attack and by others, an educational TV station in San Francisco put on an hour of discussion in October, 1969. A biologist from the University of California was asked to speak for the evolutionary side of the case; a member of the education department of the University spoke from the teachers' viewpoint; and then it was decided that a creationist should be asked to defend that side of the case.

Harold G. Coffin, Research Professor of the Geoscience Research Institute, and Professor of Paleontology at Andrews University, Berrien Springs, Michigan, was called to San Francisco to take part in the discussion. After Coffin returned home he wrote out a 44-page manuscript on the scientific evidences for creation and sent a copy to every member of the Board. To what degree his effort was instrumental in their decision cannot be said, but when they met a few days after this incident, they voted unanimously to accept the revised schedule requiring that creation as well as evolution be taught in California schools.

This action by the State Board of Education set off violent repercussions. Some declared that it would take California back to the Dark Ages, and make state educationalists a laughingstock of the world. Creationists, on the other hand, were jubilant. To the statement made by some that this was a return to blind, ignorant prejudice, it

has been pointed out that the statement in the revised Guidelines requiring teaching of both views was written by two doctors who were members of the State Board.

The situation has been complicated by the fact that textbook publishers have been at a loss to know what to put into their books. Opposition to the teaching of creation finally led, in 1972, to a revision of the statements to the effect that evolution was an unproved theory, with no mention to be made of creation. To this the advocates of creation responded by pressing for more positive statements regarding creation.

In the *Newsletter* of the Biological Sciences Curriculum Study committee of November, 1972, William V. Mayer, Professor of Biology at the University of Colorado, and Director of the BSCS, argued that the reason why creation should not be taught in the public school is that it is not true science, because it cannot be proved by observation or experiment. He apparently regards it as a religious dogma rather than science.

On this point, Henry M. Morris, in *Impact Series No. 1*, of the Institute for Creation Research, says that both are models, or frameworks, within which the facts of nature can be correlated or compared; but neither can be tested or proved. They are valuable as instruments by which the data of science can be interpreted.

A storm of protest arose as these proceedings were in progress. Nineteen Nobel prize winners demanded that creationism be excluded from the public schools. The National Academy of Sciences opposed the California move, as did the American Association for the Advancement of Science. The Association of Biology Teachers has also opposed creation teaching.

Because of pressure the California State Board of Education rescinded their action, and the matter was left unsettled for considerable time. However, they subsequently took another action requiring that in the social sciences (not in physical or life sciences) both sides of the evolution-creation question shall be presented. "In the

study of such systems of belief," the ruling states, "the teacher must be respectful of the commitments of students."

A questionnaire that I sent to all the state departments of education brought replies from about forty states. In most of these states the matter of what shall be taught about origins is left to the local school boards, with the provision that it must be in harmony with the Supreme Court decision that all religious teaching must be of such a nature as not to "indoctrinate." The literature, morals, and historical features of the Bible may be taught, as long as doctrinal points are avoided.

A few states have taken action either to require or to encourage the presentation of the scientific evidence for creation. As of this writing, most of the states have made no such move, although agitation is spreading through the activity of creationist organizations such as the Creation Science Research Center and the Bible-Science Association.

In Crescent City, California, an Adventist public-school teacher, Louis Goodgame, organized a county-wide survey. Nearly 90 percent of the people interviewed favored teaching both creation and evolution. A survey in the Cupertino Elementary School District, in Santa Clara County, California, showed much the same results. As a result of this pressure, the school boards are attempting to make arrangement to allow the scientific creation theory to be taught.

What, then, say the leaders in the creationist movement, should be taught in the schools? If evolution could be proved, of course it should be taught. If creation could be proved, certainly it should be taught. But since neither can be proved, and there are millions of people who believe in evolution and millions in creation, both should be taught, and the pupils allowed to take their choice as to which to their minds seems the most reasonable. But it is manifestly unfair to teach only one side of the question.

Evidence of the growing concern over the question of

evolution or creation is shown by the fact that a Creation Conference was held in Milwaukee in 1972, and another in 1974, at which several creationist speakers presented scientific evidence to support their views. Also at the annual meeting of the National Association of Biology Teachers meeting in San Francisco, October 26-28, all of one afternoon was devoted to presentation of creationist arguments by John N. Moore and Duane Gish.

What the future of the evolution-creation controversy will yet bring forth, no one can predict. But it is evident that the day when creationists offered nothing but a religious dogma has passed. An era of scientific recognition may be dawning.

Due to space limitations, not all the publications now in circulation in the creationist movement can be mentioned. A complete catalog can be obtained from the Bible-Science Association, Box 1016, Caldwell, Idaho 83605.

Chapter Seventeen

Problems of Interpretation

IN THE previous chapter we presented the work of several organizations that are promoting conservative views of creation. This does not mean that every detail is agreed on by the various writers and publishers, but it does show a healthy trend when Christians can work together for a common cause, even though differing on theological questions. Nor does it mean that the churches to which these creationist workers belong officially support their views, either in part or in whole. There is much room for divergence of opinion, and this is to be expected, when the subject of creation has been either neglected or wrongly interpreted for so many years. It will take a great deal of discussion to bring any degree of full understanding between the different creationists. But in spite of these problems, there is much to be gained from the concerted effort that is being put forth.

In this chapter we wish to survey some of the variations in interpretation that exist among different church groups, and to note some disturbing elements that are coming into the field of science and religion. It is an interesting observation that as a general rule, discussions of creation in the older encyclopedias are much more conservative than in the more recent ones. There is a general trend toward more liberal interpretation of the

Genesis record, which in many cases amounts to a practical rejection of its literal aspect.

One of the publications that took a firm stand on the question is the *International Standard Bible Encyclopedia*, (76) published in 1943. From the article on *Evolution* we make several citations:

“An evolutionist may be an agnostic, a pantheist, or a theist, according to his attitude toward the question of beginnings. Evolution is unchristian—diametrically opposed to the Christian system of thought in all essential points, for (1) it excludes a transcendent God, as well as one imminent in nature, and leads to pantheism, and (2) it nullifies the idea of creation; the hypothesis of evolution is speculative.

“‘An all-powerful God could have made the world and created men and women by evolutionary processes if He had so desired and willed; but the Bible revelation tells us that He did not so make the world . . . and so we may stand upon that revelation with full assurance.’

“(Continuing the points against evolution): (3) it degrades man, making him come from a beast; (4) it invalidates Bible authority; Bible miracles are impossible on the evolution interpretation; (5) it denies the truth of Christ and His virgin birth; (6) it denies the fall of man; (7) it destroys the doctrine of sin; (8) it negates regeneration; and (9) it is contrary to Christian ethics.

“‘It is impossible for any balanced and rational mind to think that an all-wise, all-powerful, all-*good* God would have resorted to a cruel and merciless process for producing His creatures. And it is especially revolting to think that a good and loving God would have produced man . . . by a long-drawn-out ordeal of selfish struggle, cruelty, vindictiveness, and callous disregard for the rights, feelings, and desires of other creatures, which had to be trampled down in order that man might rise. . . . The fundamental fallacy of evolution is the idea that strife and struggle are the way of life.’” (167:1048H)

On the question of the attitude of different church

groups, we mention three, the Seventh-day Adventists, the Jews, and the Roman Catholics. These three are chosen for the following reasons: (1) the Adventists because, of all Protestant denominations, they have without doubt held most consistently to the conservative creationist view, (2) the Jews because it was from their sacred writings that the creationist doctrine first came, and (3) the Catholics because they are the oldest of all Christian bodies and have dealt with the question longer than anyone else.

For the Seventh-day Adventists we quote from the *Seventh-day Adventist Bible Dictionary*:

"Some competent men of science have taken a new look at the Biblical account and have found nothing in the discoveries of science that disproves the record of the origin of life on this planet given in the Creation narrative, even when the account is taken literally. They note that if one is willing to accept the fact of a miracle-working God, it is then no more difficult to believe that He created life in complex forms than that He created only a single cell from which other life forms developed, and it is no more difficult to believe that these complex forms were brought forth in a moment than to believe that long eras were involved in their development. They consequently find no difficulty in believing that in the course of 6 literal days of creation God created the ancestors of all living plants and animals on this earth. They point out, however, that since Creation there have appeared on earth many new species and varieties not exactly like their ancestors—a development not denied in the Genesis record. These new forms have come about, as science attests, through a combination of factors such as mutations, chromosomal aberrations, geographic isolation, and hybridization. But in every case the new forms are so similar to their ancestors that they can be traced back without great difficulty." (146:234)

For nearly three-quarters of a century Seventh-day Adventist writers have been pointing out the weaknesses

of evolution and upholding the literal creation viewpoint. To my knowledge all official publications of the denomination have been in full accord with the above quotation. That does not mean that there may not be some variance in view on minor matters, but it does mean that there is strong agreement on all fundamental points.

For the Jewish viewpoint we first quote from a Catholic source:

“Their [Israel’s] beliefs and teachings on creation . . . far transcended anything found in . . . other cultures because of the transcendent concepts of God and His relation to the cosmos held by the Israelites.” (115:IV:418)

As to a Jewish authority we take excerpts from the *Universal Jewish Encyclopedia*, published in 1941. This is doubtless the most authoritative:

“The modern Jewish theologian is faced with the problem of reconciling the traditional Jewish concept of creation with the epoch-making discoveries of science in the 19th and 20th centuries.” (161:III:398)

“Modern scholarship is in general agreement that the first eleven chapters are a collection of ancient Israelitish folk-tales, traditions, legends and myths largely derived from Babylonian traditions. . . . The charming stories of Genesis are a compilation of the beliefs of primitive Hebrews about [fundamental questions]. . . . We should not expect to look upon Genesis as possessing any scientific value for the modern world.” (161:IV:528)

“The idea of a creation that took place at a given time . . . is replaced by the idea of a constant process of creation. . . . Modern Judaism accepts the conclusions of science but it adds to them its own thought: that behind all existing things is the ever-present God, the perpetual Creator.” (161:III:398)

“It is impossible to maintain the Biblical stories of creation in their literal sense.” (161:III:398)

Obviously nothing more needs to be said to make the Jewish position clear.

For the Catholic position we start with the encyclical of Pope Pius XII, September 20, 1943. (115:IV:925) In this he says that the traditional fundamental approach to Biblical study is insufficient. A new and scientific approach is necessary. We should accept the positive contribution of scientific research toward a solution of Biblical difficulties. In his *Humani Generis*, on August 12, 1950, he urged that men continue present research regarding evolution of the human body. Such an opinion is, he asserted, not a certain conclusion, and should be approached with caution. (115:VII:215)

Quoting from the New Catholic Encyclopedia, published in 1967:

"The theory [of evolution] has . . . become one of the essential principles of modern science. It is no longer presented as merely an explanatory hypothesis, or even as a theory in the usual sense, but as a scientific fact apart from which known realities cannot be understood." (115:V:676)

"Accepting as incontrovertible the evidence that the body of man is the product of biological evolution, and that man participates in the same complex process of organic derivation that affects all the rest of the living world, scientists still note three sources of problems." (115:V:676)

These problems, the article goes on to say, are: (1) many details of evolution are obscure or uncertain, (2) no concept of human evolution envisions continuous progress, and (3) no one claims to have identified all the factors involved in evolution.

Full credence is given to the paleontological evidence for the origin of man. The Biblical story of creation is not science, but simply poetry or allegory. (115:IV:425) "As far as biology is concerned, . . . there is no reason to believe that the factors regulating human evolution are perceptibly different from those observed in the evolution of living things in general, plant and animal." (115:V:679)

“No contemporary scholar could hold that man descended from a monkey. . . . The only acceptable formula is that which affirms the parallel descent of man and of monkeys from a common . . . stock.” (115:V:677)

Possibly some reader will ask how it is that the Catholic doctrine of the origin of man now accepts his origin by evolution, whereas we noticed that Catholic doctrine once advocated creationism. But it must be pointed out that creationism as taught by Suarez in the 17th century is a different philosophy than that now being taught. In the Protestant Reformation the “back to the Bible” movement protested against the Neo-Platonic philosophy that had been taught through the Middle Ages, and had resulted in a practical pantheism. The philosophy advocated by Suarez and others in the Catholic Counter-Reformation was similar in emphasis to the Protestant Reformation. It taught that God had created matter; it was not an emanation from Him as in Neo-Platonism; nor was matter eternal, as some believed. Thus both Protestant and Catholic reform movements emphasized the creative power of God. We must remember that at that time there was not enough knowledge of plant and animal classification to raise any question about the origin of species; nor was there any geological knowledge to raise questions as to the age of the rocks. In that state of scientific ignorance there was nothing to cause men to believe in evolution. The Bible record of creation was accepted for what it purported to be, the account of the origin of the earth, of plants and animals, and of man. It was not until the 19th century that scientific theories of evolution developed. And, as we see from the quotations just given, the scientific “discoveries” of the 19th and 20th centuries have been incorporated into Catholic dogma.

On the other hand, it must not be overlooked that Catholic dogma does contain a philosophy of creationism. Notice these statements:

“The Catholic faith obliges us to hold that souls are immediately created by God.” (115:IV:428)

This is a normal, not a miraculous, intervention on the part of God. The soul does not evolve, but has its origin only in the creative act of God. (115:IV:429)

"Creationism is . . . the only theory of origins of the human spirit that is philosophically satisfying. In this view, when organic matter is properly disposed for the creation and infusion of the human spirit, God creates the individual soul to animate the body that is so disposed." (115:V:684)

We must be very careful, as can be seen from these quotations, to distinguish between the Catholic philosophy of creationism and that which is held by those who reject the evolutionary theory. It is the latter view that prevails throughout the discussions in this book and in most creationist literature today.

Among other churches than those discussed here, great differences of opinion prevail. Some Presbyterian Church leaders have endorsed evolution, while others have not gone so far. Strong debates have been going on among Southern Baptists, and a number of congregations have left their Convention because of the modernist attitude of some Sunday-school leaders and theological seminaries. Conservative Baptists, on the other hand, stand firmly for the literal interpretation of Genesis. Certain branches of the Lutherans are conservative, accepting the creation record at face value; others have swung to a liberal, evolutionary philosophy. Even some Seventh-day Adventists, in spite of the support of Biblical creationism that the church has long maintained, are leaning toward an attitude that in some cases is tinged with evolutionary trends. What the future holds for these divergent views, is difficult to predict.

"One interesting side effect of modern concern over the evolution-creation issue is the emotional response generated by the very mention of either word," says Henry M. Morris, former president of the Creation Research Society. (106) To avoid this reaction, many textbook writers cautiously weave in the evolutionary ap-

proach without actually using the word. There is an increasing substitution of the term "progressive creation" to replace "theistic evolution."

The result of this strategy is that essentially the identical theory can be taught without generating the violent reactions that are produced by evolutionary teaching. However, the end result is the same, the substitution of long-time progression in living things rather than literal creation as recorded in Genesis.

In recent years the attention of creationists has been called to the Cosmonomic philosophy of Herman Dooyeweerd of the Amsterdam Free University. His great work, *The New Critique of Theoretical Thought*, (50) has become very influential throughout Dutch Reformed circles, and has attracted interest in other church groups.

Dooyeweerd's work contains an analysis of the entire range of human thought and life. He claims that Christian theory is impregnated with creationist attitudes. The creationist aspects of his philosophy have been utilized perhaps the most fully by the late J. J. Duyvene de Wit of the University of the Orange Free State, South Africa, and by E. L. Hebden Taylor of England. In the preface to *Evolution and the Reformation of Biology* (157) Taylor says:

"In this monograph I have tried to present a Reformed scientific approach to modern biology along the lines suggested by Dooyeweerd. . . . Such an approach is the only one in the opinion of the writer which can effectively answer modern apostate megaevolutionism since it refuses to compromise in any way the scriptural conception of man and the cosmos with the apostate humanistic view of reality."

The following is an excerpt from Taylor's evaluation of Dooyeweerd's philosophy, by permission of the Craig Press:

"The Reformed scientific approach to modern biology is the only one which can effectively answer the modern apostate evolution. The facts of science can be interpreted

in either of two frames of reference: (1) evolutionary naturalism, or (2) the Biblical account of creation. As a result the Christian believes that the universe derives its existence from Almighty God who created it for His own glory out of nothing. It follows that scientific thought and research are fundamentally a religious activity. And if scientific work itself is a religious activity, then there can be no conflict between faith and science.

"One of the most important scientific problems is that of the paleontological record. But is evolution the only or even the best possible explanation of the fossils? It is quite possible to explain the fossils equally well or better in terms of the Great Flood described in the Book of Genesis. In fact, recent works on this subject have shown that the Great Deluge alone offers a plausible solution to the enigma of the fossil record.

"If the fossil record cannot provide scientific evidence for the validity of the theory of evolution, can genetics do so? Evidence for a gradual increase of genetic material in successive higher-organized material is, in fact, completely lacking. Authorities have admitted that recombination is incapable of bringing about the transformation of one species into another. Therefore the postulated idea of a continuous progressive evolution by means of mutations of genes must be abandoned.

"Neither mutation nor natural selection are capable of producing progressive solutions in the sense required by evolution. On the contrary both processes finally lead to the extinction rather than the creation of new species.

"The human body is an individual whole, with a complex inter-relationship of structures and functions. These are: (1) the physical structures, (2) the nervous system governing the activities of the organism, (3) the psychic activity of the nervous system, (4) the coordination of all these functions into knowledge, imagination, and will. Man is created in the image of God; the human body is the instrument of the mind which dwells within it. In this function of mind and body the religious life of

man is centered. The human soul is man himself in the unity of the spiritual existence. At death the whole body, that is, all man's temporal functions, is destroyed, neither thought nor faith excluded. What ancients called the 'heart,' the inner essence of human existence, is that life given by God to man. It is impossible for man to explain it, because we know of it only as God has revealed it in His Word.

"The theory of evolution is misleading because it is associated with the idea of progressive improvement, whereas it has been shown that the scientific evidence only points to alterations *within* different types. For the Christian to use the word "evolution" is meaningless. The Biblical account of the creation of the cosmos by God provides a more reasonable framework than does evolution. The recently discovered sciences show that the doctrine of evolution is not proven scientifically. Only by accepting God's Word as the ordering principle in scientific study can we make sense of the data of science. It gives a true knowledge of God, of ourselves, and of the operations of the created universe. God is the true architect of the universe, and His laws are the universal principles operating throughout all nature."

In the March, 1971, issue of *Creation Research Society Quarterly*, Samuel T. Wolfe gives a critical appraisal of Dooyeweerd's philosophy in relation to creationism, adding some recent trends. (168) He says that in spite of the creationist focus of this philosophy, things have changed at the Amsterdam Free University. The Professor of Zoology, Jan Lever, accepts evolution as a process. This attitude was recently expressed by Professor Van de Fliert in his criticism of Whitcomb and Morris' *Genesis Flood*, in which he asserted that to adopt the position taken by these men would be to destroy the basic principles of modern Christianity.

While De Wit accepted the creationist views of Dooyeweerd, he pointed out that they did not involve a literal view of time-sequence in Genesis 1, whether

24-hour days or geologic time. Apparently Dooyeweerd did not get down to the detailed view of the modern creationists. Wolfe says in closing his review that "it is hoped that Taylor and other writers of his persuasion will develop a fuller synthesis of Dooyeweerd's non-evolutionary religious root and a true Biblical Creationism. . . . It is . . . possible that Creationism is what Dooyeweerd should have been seeking all this time in the arena of natural science."

For many years liberal influences and "modernistic" tendencies have been creeping into educational circles, with a resulting wave of skepticism and loss of faith in the fundamentals of Christian faith. As an illustration we see the work of America's noted educator John Dewey. Bolton Davidheiser and C. O. Weber (44, 163) have characterized Dewey's influence in no uncertain terms. We give a brief abstract of their appraisal:

"He was the foremost spokesman of democracy and science. To his admirers he represented all that was hopeful; to his critics he stood for all the ills in society. He praised the accomplishments of Lenin and Trotsky, and advocated a new social order. Experience, he said, is the ultimate authority in knowledge. Supernaturalism was rejected, and he advocated a way of life free from 'superstition.' He rejected God and abandoned the Biblical standards of ethics. Moral values are subject to perpetual reconstruction.

"Dewey's philosophy was that of pragmatism. The criterion of truth is expediency. There are no absolute values. Whatever works is right.

Davidheiser uses quotations from two encyclopedias to reinforce his point:

"*The New Funk and Wagnalls Encyclopedia* says that according to the pragmatic point of view 'the test of a truth of a thing is its practical utility.'

"*Collier's Encyclopedia* says: 'All pragmatists come together on a number of fundamental principles . . . among these principles are . . . the repudiation of any-

thing as absolute or fixed or final, either in human nature or nature.' It further says that in pragmatism the judgment of every value, such as the true and false and the good and the bad, are based upon the consequences to the individual." (44:109, 110)

Dewey is not the only example that might be cited. American education has been permeated with the liberal spirit. Dr. Max Rafferty, former California Superintendent of Public Instructions, is cited as saying that he "believes that the decline of absolutes as the bases of standards is responsible for the growth of such evils as public immorality, juvenile delinquency, and vandalism." (44:110)

The movement of Christianity away from pure Biblical doctrine of creation is leading to astonishing and frightening results. Instead of faith in the Genesis story of creation of the earth and its life by the power of God, and the creation of man in God's image, men are turning to all kinds of "black magic" and reviving the devilish arts of the Dark Ages.

In *Telenotes*, September, 1972 (a publication of the Faith for Today broadcast), the following appeared over the signature of the editor, Gordon F. Dalrymple:

"Worship of Satan has been a mark of paganism from time immemorial. Now it has invaded Western civilization.

"As a substitute faith, the occult has a variety of manifestations.

"In San Francisco, Satan is addressed as Satan, the controller of all human destiny, the arbiter of human affairs.

"Pan American Airways is currently offering a special psychic tour of Great Britain. It includes visiting a seance chamber, the privilege of meeting some of Great Britain's psychic leaders, a tour of a healing center, and brochures dealing with the occult.

"Satan worshipers request their god to do everything from putting down an office rival to investing them with

supernatural power to meet life's daily problems.

"Sales of occult books and periodicals in the San Francisco area alone are totaling \$12,000 to \$20,000 monthly.

"For the past 52 weeks *The Exorcist*, by William P. Beatty, has stayed on the best-seller list. Its theme of parapsychology has gripped millions. Books, movies, college classes, today are dealing with varying aspects of the occult.

"How many devotees of the occult are there? In the U.S. the estimate is from 8 to 15 million. It is claimed that at least 3.5 million West Germans are active members, with several million more in sympathy with the movement.

"Who are those who become absorbed in the occult movement? Some, such as Sybil Leek, claim to be outright witches. Many others are concerned with mastering the world around them. Gripped by a feeling of insecurity, unable to cope with the problems of life, dissatisfied with the formulas for peace and tranquility offered by organized religions, they have turned to the occult world.

"Nor is all the occult involved specifically with direct Satan worship, but the entire movement trends in that direction.

"Millions involved in spiritism, astrology, magical arts, mystic rites, and pagan worship find themselves on common ground.

"It is not surprising that much of what Satanism offers clearly contradicts every tenet of Christianity. Jesus emphasized that love was to characterize human relationships. Satanism directs, 'If a man smite you on one cheek, smash him on the other!'

"A Satanic 'Bible' has been prepared that includes the rites and inverted counsel of Satanism and also an outline for the faithful as to how to conduct Satanic worship.

"Stemming from Satanism have been sex clubs and worship groups with rituals from Satanism. Drug-oriented cults have also appeared, most notorious of which is that of Charles Manson and his purported fam-

ily. Some devil worshipers have been accused by law authorities of grave robbing.

“Aligned with Satan worship is spiritism, an ancient cult that has claimed that it is possible for the living to contact their beloved dead. Some spiritual healers have moved into the area of spiritism, using the ‘theology’ of Satanism to ‘effect cures for the ill.’”

From England comes this information:

“A British evangelist has attributed his country’s increasing suicide rate to witchcraft and other occult practices.

“‘Your craze is drugs,’ said Dr. Eric Hutchings. ‘In Britain it’s demons. How it has all happened or why I don’t know. Perhaps we have turned God out of England. Only seven out of every 100 people still go to church.’

“The clergyman claimed to have converted only one witch to Christianity, though he said many ‘demon possessed’ people came to his crusades.”—*The Review and Herald*, October 8, 1970.

The religious world has been quite shocked by the disclosures by the late Bishop Pike in regard to his “contacts” with his son who committed suicide, and with the reports of Mrs. Pike on her “visions” of her husband’s death and the spirit leaving his body. Spectacular though these reports are, still they do not give anything like the true picture of what is happening, both in America and in Europe. It is reported that thousands of clergymen are contacting the spirits continually and receiving advice from them. All of these facts simply illustrate what happens when the record of the seduction of Eve in Eden by the serpent is regarded as a myth instead of a real occurrence. Rejection of the Genesis story of creation and the fall of man opens the way for all kinds of heresies.

It is reported by book dealers that books on the occult are among their best sellers, and further, that about 40 million readers follow the horoscopes in about 70 percent of the country’s newspapers. Ten thousand astrologers and 175,000 others who dabble in the profession give

their predictions in books, pamphlets, and magazines and newspapers. Astrology, as we have seen, is based on the pagan superstition that the stars are alive, and that they have the power to influence human behavior and destiny.

Political leaders in many foreign countries believe in witchcraft, magic, and spiritualism. Of course this is not surprising, as the background of the religious life of many of these countries is founded on beliefs in the spirits. But when men come from these countries to England and America for an education, and there in their courses in anthropology are taught ideas that support rather than oppose their native superstitions, it is a sad comment on the spiritual state of so-called Christian civilization and culture.

Europe is seeing a remarkable revival of medieval magic. Appearances of ghosts and demons are being reported throughout Europe. Some observers state that in France there are more sorcerers than medical doctors. In England witchcraft is discussed on TV, and a school for potential witches has been opened.

These developments cause great concern for the conservative creationists. In the next two paragraphs I present what I find to be the general feeling among them regarding the results of the rejection of the creation doctrine.

Many fail to realize how vital to the retention of a pure faith is belief in the Genesis record of creation. If Genesis 1 is an allegory, a myth, or mere superstition, then the story of the Fall and the advent of sin into the world must be thrown out. With that goes the whole chronology of Genesis 5 and 11, and in its place are substituted the geological ages. The early history of the Hebrew people becomes only folklore, and the giving of the Law of God on Sinai means nothing; the Ten Commandments are nothing more than a Jewish code of ethics. One by one the fundamental truths of the existence of God, the plan of redemption, and the scriptural basis for Christian doctrine are dissipated, until we have nothing solid left

upon which to stand. This is all the natural, inevitable result of rejection of the creation story, which is basic to all Christian belief.

The conflict between the revealed truth of creation and scientific theories is deepening and taking on massive proportions. The philosophic superstitions that plagued Christianity for centuries, and which the modern period of enlightenment seemed for a while to have largely eliminated, appear to be returning like a flood to engulf our civilization. It is time for a return to the fundamental principles that lie at the foundation of all true religion and science—a recognition of the literal creation of the earth and its life under the almighty power of God. The Genesis record is the only authoritative outline of ultimate origins, and cannot be lightly disregarded.

Chapter Eighteen

In Review

ANCIENT paganism was essentially nature worship. Matter was regarded as eternal; natural forces operated of their own inherent power; gods were personifications of natural forces. Against this nature worship the doctrine of the Creator-Jehovah-God stands diametrically opposed. God is the great I AM, before and beyond whom there is no other. All things in heaven and earth were created by Him and for Him, and His divine power momentarily exercised keeps all things in action.

Throughout the succeeding centuries the battle has been the same—naturalism of one kind or another battling for supremacy against literal creationism, which stands for the principle of divine intervention in nature.

The vital issue has always been whether philosophy and science should take precedence over the Biblical records of creation and of the control of God over the operations of nature. In different ages, under different designations, the problem has been the same. Sometimes it is known as naturalism *vs* supernaturalism, science *vs* religion, science *vs* the Bible, Fundamentalism *vs* Modernism, or conservatism *vs* liberalism.

But the problem in our day is not easily disposed of by assigning names categorically. For example, it would be a mistake to place science as in opposition to Scripture. All

shades of meaning have been placed on these ideas, and many types of naturalism and creationism have been commingled until the situation today is very confusing. It is hard to know what anyone is talking about. A man may advocate evolution and yet claim to be an ardent creationist. What is an evolutionist? What is a creationist? Everyone should be familiar with the different interpretations in vogue today, for there is nothing gained by setting up what we might imagine to be an issue, only to find that we are fighting a straw man. So let us review the present situation and see whether we can make any sense out of the existing confusion.

First, let us review our definitions of terms. Evolution is defined as cumulative change, by which self-reproducible substance emerged most naturally in nature eons ago in primeval seas. A dictionary definition is that evolutionism is the doctrine of descent of all living things from a few simple forms of life or from a single form; the progress of the universe from simplicity to complexity. Opposed to these ideas, creationism is defined as the doctrine that matter and all things were created, substantially as they now exist, by the fiat of an omnipotent Creator, and not gradually evolved or developed. Between these two fundamental ideas there can be no real compromise.

In considering the question of evolution or creation, and the Biblical records of creation and the Flood, it is vital to recognize the role played by the doctrine of inspiration of the Holy Scriptures. Fundamental creationism is based on the belief that the Scriptures are inspired by the Spirit of God, and therefore are valid not only as theology but as history and science. This view is well expressed in the statement of belief of the Creation Research Society, Article 1:

“The Bible is the written Word of God, and because it is inspired throughout, all its assertions are historically and scientifically true in all the original autographs. To the student of nature this means that the account of

origins in Genesis is a factual presentation of simple historical truths."

This view is in contrast with the popular view of inspiration, that certain men were "inspired" to study and investigate, to gather knowledge and to catalog it, and to record the results of their study. Such a view is not acceptable to conservative Christians. They maintain that the Bible is the revealed Word of God, in all aspects of truth—ethical, moral, or scientific. This is clearly stated by Morris:

"The fact of a special creation of the cosmos in the beginning is affirmed by Scripture and confirmed by true science, clearly and emphatically. The verb 'create' used so often in the Bible has no subject except 'God' and thus refers to work which only He can do. . . . According to the divine record of Genesis 1, the creation week was occupied by God both in 'creating' and 'making' the cosmos, and when this week was finished, the record repeatedly stresses that God's 'creating and making' activities were now finished (Gen. 2:1-3)." (104:17)

This fundamental philosophy is accepted by conservative creationists. It is in striking contrast with the basic assumptions of evolutionists, who depend on purely mechanical operations of a nonintelligent mechanism, or upon the superintending power of God throughout long periods of evolutionary progression rather than within the limits of the creation week of Genesis.

Now that we have defined, basically, both evolution and creation theory, let us proceed to analyze the various shades of interpretation that have been placed on both views. First, we will consider evolution. There are five different evolutionary theories, depending on the degree to which God is admitted to have had a part in the developmental processes.

1. *Atheistic*. This view allows for no God whatsoever. Matter and energy are eternal. All progression is by means of inherent properties. There is some kind of an inherent urge upward—what Aristotle called the tendency to per-

fection—that has driven nature from simple, unorganized states to the complexity of today.

2. *Materialistic*. This theory assumes that matter is automatic in its action; there may be no God, or a God may be allowed, but His relation to material substance is unknown. God may be conceived as a spiritual being, but without any direct connection with the natural world; He might interfere on occasions. This type of evolution theory is very indefinite, and is largely agnostic.

3. *Pantheistic*. God and nature are one, therefore God is nothing but an essence of power pervading the natural world. This type of religious belief is especially strong in India and some other Oriental countries. There are traces of it in the Western world, under various names, such as hylozoism.

4. *Deistic*. God created matter and endowed it with properties by which it has evolved into the present complexity. God is more concerned with spiritual concerns than with the material world. Many modern scientists lean toward the deistic view. It allows their thought the same range of freedom as does materialistic evolution, but still acknowledges the existence of God.

5. *Theistic*. God created matter and the first forms of life, and evolution has been going on through ages of time under His direction and superintendence. In other words, evolution is God's mode of creating the universe and its life.

Most of these evolution theories acknowledge the existence of God and His relation to nature to a greater or lesser degree. For this reason one should be careful not to label all evolution as atheistic, for much of it is not. As can be seen, there is much skepticism regarding God's existence and a great lack of conviction regarding His nature and His relation to the natural world. But evolutionists should not be accused of being atheists unless they are avowedly so.

However, one thing should be noted with respect to all of these theories—the Genesis record of creation and

the Flood is generally regarded as myth or legend, with no scientific value. But deists and theistic evolutionists are common among scientists, and many of them are sincere in their Christian faith, even though they differ from conservative creationists.

When we come to a survey of creationist theories we find that aside from accepting the basic definition of creation, they also hold many shades of interpretation, and this is a cause of considerable confusion. To my knowledge no church has yet definitely and precisely defined its views regarding creation. In a preceding chapter we have given the general position of the Catholics, Jews, and Seventh-day Adventists, but these views are only on major points; no minor points have yet been elaborated, except in the writings of individual members.

Four major viewpoints have been held, or are now held, by creationists. Let us discuss them briefly:

1. *Day-age theory.* This was popular in the early part of the 19th century, and is still believed by some who do not realize that it cannot be harmonized with modern geological data. It takes the position that each day of creation described in Genesis 1 was a long period of time, during which certain types of life arose and flourished, then were replaced or augmented by others in following days. This theory does not offer any satisfactory explanation of the fourth day, which is concerned only with the heavenly bodies. Neither does it make clear what is meant by the expression "evening and morning" in the record.

A recent variation on the day-age theory is the suggestion that the record of Genesis 1 was a record of revelations that God gave the writer day after day. This is the weakest of all creation theories.

2. *Ruin-and-restitution theory.* This assumes that "the beginning" mentioned in verse 1 was millions of years ago, and that between it and the record of the six-day creation was a gap of millions of years. The idea of ruin and restitution is based on a rendering of the words "and the earth was without form and void" as "and the earth

became.” The word for “was” is translated “became.” The theory is that in the beginning God placed Lucifer and other beings on the earth. They rebelled against God and tried to carry their rebellion into heaven. The Lord punished them by making them remain in a ruined world, while He carried on His continuing creation during long ages of time. Eventually, God restored the world to its pristine beauty in the six days of Genesis 7. But He left Lucifer and his hordes on the earth, with the result that when man was created, rebellion was continued in the human race.

This theory meets with difficulty because it is based on extravagant applications of Scripture, and cannot be harmonized with geological data any more than can the day-age theory.

3. *Progressive creation.* In order to give a place for the geological ages, some have assumed that creation was progressive throughout the ages. God began to create by making a few simple forms, then adding more and more as time went on, until finally He reached the climax in the Tertiary Period or thereabouts. The reason for conservative creationists’ objection to this is that it requires that God use struggle and death as the means of bringing His creation to perfection. Instead of creating a world over which He could pronounce the words “very good,” He created a world with the “reign of tooth and claw.” Is that the best He could do? ask the conservatives.

4. *Special creation.* This is the view followed by those who accept the Genesis record of creation and the Flood as a literal account of the early history of the earth. The six-day creation and the Flood theories of geology are correlated, as it allows no room for the long ages of deposit of fossiliferous strata. It is this interpretation that is held by some of those who are calling for the teaching of creation in public schools.

To find a satisfactory term for this view is difficult. We have suggested “fundamental,” or “special.” Some may object to the term “fundamental,” as there is in the minds

of certain people a prejudice against the term "Fundamentalists," which began to be applied a few years ago to a specific group of religious reformers. Yet the dictionary definition of *fundamental* gives it the meaning of being basic, e.g., the basic principles of a system. Accordingly, this system of origins, based on the Genesis record of creation, has generally been regarded as being founded on primary principles. These we shall discuss shortly.

Sometimes special creation is spoken of as "traditional," because it is the oldest concept among Christians. "Traditional" means something that has been handed down from one generation to another. There is some objection to the use of this term, as it might appear that such a belief in creation would not allow for research and advanced ideas in the light of new discoveries. The terms "conservative" and "liberal" are often used to designate opposite views, and possibly "conservative" might be preferred by some to "fundamental" or "special." Anyway, we have defined our terms, and with that we may proceed to discuss the details of this most conservative of the different views of creationism.

Eight aspects of fundamental creationism should be noted. On some of them there is quite general unanimity, while on others differences of opinion may be found. This is not surprising, since the creationist movement has advanced rapidly in the past few years, and among Christians of different faiths, with different backgrounds. Many notions from past centuries have had their influence on their thinking, so it need not be a matter of too much concern if certain points are not viewed alike by all. On the other hand, note should be made of the fact that among those who are agitating creationism the most strongly there is a general agreement on major questions. Let us consider the various points and call attention to areas of agreement, as well as of variance.

1. All material substance and all energy of the universe come from the creative power of God. This is in harmony with the declaration of John that "all things

were made by him; and without him was not any thing made that was made" (John 1:3). *The New English Bible* states the matter thus: "Through him all things came to be; no single thing was created without him." I am not aware of any special creationist who dissents in the least from this idea. Of course, as we shall see later, this does not forbid changes among the original created kinds of living things.

2. The earth was created in six 24-hour days. This is quite generally agreed, although there may be a few who are not positively certain of their position on the time and length of the days. As to the rest of the universe, we shall discuss this under item 4.

A point of some difference exists with regard to the significance of the six-day period. Notably, we find that Seventh-day Adventist scholars hold that the observance of the seventh-day Sabbath is a memorial of the six-day creation. Others recognize that the seventh day was blessed at the close of creation week but believe that the observance of the seventh day is no longer obligatory. This is a theological matter, not a scientific one.

3. The earth is only a few thousand years old, but exactly how old is a matter of difference of opinion. Traditionally, following the Hebrew Bible in Genesis 5 and 11, the date of creation has been regarded as somewhere about 4000 years before Christ. Few today follow Ussher's chronology, but the figures obtained from checking back 480 years from the beginning of Solomon's Temple and 430 years between the call of Abraham and the Exodus, plus the records of Genesis 5 and 11, do suggest a date fairly close to Ussher's date for creation, about 4000 B.C., and 2300 B.C. for the Flood.

A variation arises from the fact that the Septuagint, which was the Greek version of the Scriptures in use at the time of Christ, adds another name, Cainan, after Arphaxad in Genesis 11, thus adding another 130 years to the chronology. In addition, many of the patriarchs are given longer lengths of life. The result is that the Flood is

put back to about 3,000 B.C. and creation to about 5,500. While some may not accept the Septuagint, it is highly regarded by others.

It is doubtless safe to say that the majority of special creationists regard the creation date as about 4,000 B.C. Some disregard Genesis 5 and 11 entirely, and put the date back as far as 20,000 years or even more. But they are a small minority.

4. The light of the first three days of creation is a matter of considerable difference of opinion. These should be noted separately.

a. Many believe that the substance of the earth was created at some distant time, long before creation week of Genesis 1, but very few believe there was any life upon the earth until the third day. It is held that the light of day one was "created" as an entity to itself, to illuminate the dark surface of the earth. This continued until the sun and moon were created on the fourth day. Some suggest that the light was merely the light from the presence of the Creator during the first three days. There is no unanimity of opinion on this question. It should be noted that all these ideas are purely conjectural; there is nothing in the Genesis record to demand that any one of them be accepted.

b. Some suggest that the substance of the earth was created at the beginning of day one. They share the same problem as above over the matter of the light.

c. The sun and the stars were already in existence when the earth was created, or possibly the solar system was created at the same time as the earth. According to this view, the light of the first three days would be the same as for the others—the light of the sun, moon, and stars. Support for this view is found in the expression "evening and morning" for all the six days, making it appear that their light and darkness were caused by the same phenomenon.

d. The most conservative creationists hold to the view that there was nothing in the universe at all until the earth

was created. Then in the midst of the creation week God brought all the rest of the universe into existence. This view is built on the command "Let there be light" as meaning that the luminous bodies were brought into existence upon the fourth day.

e. In contrast with view *d*, many conservative creationists hold that the expression "and God set them in the firmament" refers to a change of the condition of the atmosphere whereby the sun, moon, and stars became visible from the surface of the earth.

f. The belief that there was nothing in the universe before day four of creation week raises the question of the existence of other worlds. There are many who believe that there is no good reason whatsoever why there should not be other worlds, possibly thousands or even millions of them, in space. Why should God, they ask, confine His creative power to this one world, and produce no other beings of the nature of mankind anywhere else? Of course, if the rest of the universe was created on day four, it would be quite inconsistent to think He would make other worlds inhabited by beings like ourselves, all in one day, while it took Him six days to make this one.

It might be worthy of notice that, in talking with an Old Testament scholar and translator of Hebrew, I was told that in Hebrew the tense of the verb depends on the context. In Genesis 1:16 the Hebrew verb for the expression "God made two great lights" is exactly the same as has been translated in other passages as in the past perfect tense. That would make it read "had made." The context on which this scholar based this conclusion is the reference to "the evening and the morning" in each of the six days. The sense would be that God had created the sun and moon (and incidentally, the stars), and on the fourth day they were "set" in the firmament. The firmament is the atmosphere, not distant space. Now we know that the sun, moon, and stars are not in the firmament; they only appear to be there. In other words, they were "set," or made to appear there.

Doubtless there never will be complete agreement on the meaning of some of the statements in Genesis 1, but it is important to recognize that whatever differences of opinion there may be, the essential point is the creation of the earth during the six-day period.

5. Creationists generally accept the fact that within the limitation of the genera and the family, sufficient changes may take place to bring about the vast array of species seen in present plants and animals. It is the changes postulated in major groups—macro-evolution—that creationists refuse to believe could ever have been possible, because there is no evidence to support it.

6. Man was created in the image of God, and did not descend from animal ancestry. This position is taken by all creationists, as we have defined them. Scholars who have closely examined the evidence fail to find any cases where any of the "primitive" human skeletal material furnishes positive proof of relation to any ape or apelike form. Of course, there are resemblances, but resemblances do not prove descent. Austin H. Clark, the renowned zoologist who for many years was on the staff of the Smithsonian Institution and the National Museum, declared that while man and the apes had similar bones, there was no difficulty in distinguishing them one from the other.

7. Degeneracy, struggle, and death are not the natural heritage of living creatures, but are the results of changes that came into the world because of the introduction of a reign of evil. Adam and Eve sold their birthright, and the devil took over and did everything in his power to corrupt and destroy. The words of Genesis 6:12 are significant: "All flesh had corrupted his way upon the earth." Hebrew commentators declare that this applies to animal life, as well as to man. A threefold curse was placed upon the earth: first, at the Fall; second, at Cain's murder of his brother; and third, at the Flood.

An understanding of this fact enables the special creationist to explain many things that have been misinter-

preted by evolutionists. Much more study needs to be made along this line in order to clarify some questions and to enable the creationist to distinguish between natural phenomena and what might be considered as abnormal, owing to the curses placed upon the earth. Such problems as parasitism, for example, are difficult to explain, and to make clear how much of it is natural and how much abnormal. But on all major points the creationists are fairly closely agreed.

8. The Flood was a universal catastrophe. This position is taken by nearly all special creationists, although possibly a few have some doubts as to the certainty of that interpretation. It might be well to suggest here that we use the word "diluvialists" for those who accept the idea of Noah's Flood as a world-wide catastrophe. To use only the word "creationist" may be confusing, for not all views on creation and on the Flood are perfectly coordinated.

The position taken by some that the Flood was a local affair, occurring only in the Mesopotamian Valley, has failed to win general acceptance. Both the scriptural description of the Flood and the geological evidence point clearly to a great cataclysm that overwhelmed the whole earth.

The modern Flood theory of geology has seen some changes since it was first introduced. George McCready Price became its most outstanding advocate and promoter during the first third of the century, and almost no other studies were done on the subject during that time. Many religious leaders took his interpretation of geology and built upon it, and developed a strong evangelical movement. During the past few years some of his views have been challenged, although the major points still hold. Most geological phenomena were attributed by him to the events of the year described in Genesis. A few points remain the subject of some debate, and have not yet been fully resolved.

Until the publication of *The New Diluvialism* in 1946

few creationists recognized that there was a sequence in the fossiliferous rocks. Since then field studies have shown that there is a sequence to a marked degree, although not so much in detail as generally believed by geologists. This interpretation, which is now widely accepted by creationists, provides an explanation for the origin of the fossil sequence without resorting to long ages of time. In general it implies that the ancient world was arranged in zones, whatever the cause, and that when organisms were overwhelmed by the Flood they were buried in orderly arrangement.

For example, the Cambrian, Ordovician, and Silurian systems are almost entirely marine, and much marine life occupies the Devonian and Mississippian. The lower plant remains, beginning in the Silurian and running with increasing frequency through the Pennsylvanian, were of the nature of marsh or lowland types. Following that they represent largely upland types. The animals of the higher systems are also largely of upland types, although there is evidence of much water life all the way up through the geological column.

When the ecological zonation theory was first put forth, some misunderstood its implication and thought that it required the acceptance of the idea that the fossils once lived in the exact location where they have been unearthed. This was not the intent of the theory at all, for it must be recognized that the violent washing of the Flood would cause more or less mingling of the original zones. Some geological formations may cover as much as 100,000 or more square miles with thin layers, from a few feet to a hundred. Obviously these could not be expected to represent the exact sites of the original living things. But in general, the major types do lie in a rough order that represents their original relationships.

The zonation theory is given as an alternative to the geological-ages theory.

Another point that was slow in coming out, was that there actually has been a "glacial period," great sheets of

ice on the continental areas of Northern Europe and Northeastern North America. But evidence indicates this to be practically unquestionable, and most creationists have accepted the idea.

Price also argued strenuously against the theory of overthrusts, but this has now been quite generally accepted. A few very conservative diluvialists still hold out against it, while others admit the validity of the concept on a small scale, although not with respect to very large masses of rocks. This is one point that needs further study. Personally, I regard it as one of the strongest lines of evidence for the terrific forces acting at the time of the Flood.

One feature of "Flood geology," or diluvialism, that is now beginning to receive more attention than in the past is the possibility that many geological features owe their existence to action *after* the Flood. The general idea in the past has been that at the close of the year described in Genesis the Flood action suddenly ceased. But recent studies indicate that for a long time afterward violent action, far beyond what we have generally conceived, continued to wrack the earth. Some of this action must have been volcanic. This field has not as yet been explored at length, but is worthy of attention.

To cover this subject adequately would require hundreds of pages, but it is not the purpose of this book to go into technical details. Two works have dealt with the subject more fully. They are, *The Genesis Flood* by Whitcomb and Morris, (165) and *Fossils, Flood, and Fire* by Clark. (23) The first gives two approaches, the theological by Whitcomb, and the geological by Morris. The second begins at the bottom of the geological column and traces the Flood action through to the top. These two works may not agree perfectly in detail, but are both committed to the thesis that the Flood was universal and the major cause for the geological phenomena on the surface of the earth.

There may be an inclination to become impatient

because the real truth regarding the origin of the earth and its life is so slow in being formulated. In this connection, note the words of Leonard R. Brand in an article entitled "A Philosophic Rationale for a Creation-Flood Model," in *Origins*, vol. 1, No. 2 (1974):

"I believe that before we can make a fair comparison between the long-ages paradigm [pattern] of the geologists and the Biblical ideas of a short chronology, we will have to build an entirely new paradigm. This will only happen when enough scientists in various disciplines have sufficient faith in revelation to stake their careers on the effort. . . .

"Judging from the history of other scientific paradigms, it would seem that an incorrect geology paradigm will eventually be rejected for a better one. . . . The process could be greatly speeded up if enough people were working on a competing paradigm now."

And so there is hope for the future if enough qualified scientific men throw their efforts into the problem of evolution-creation, and search out the evidences that will hold against all opposition, theological and scientific. The "battle over creation" is not finished yet; the future is destined to see challenging new facts brought to light. Many ideas on both sides now believed to be unassailable will have to be abandoned. But in it all, if there is a settled faith in the verity of God's Word, then science and faith will eventually walk together.

Biographical Briefs

It has been a problem as to which names should be included in this list, but it has been decided not to include any now living; the list is so long, and their work is not yet finished, so it would be impossible to judge them fairly. It has been necessary to omit some who might be worthy of attention, but space is limited and a selection must be made.

AGASSIZ, LOUIS. 1807-1873 A.D.

Swiss geologist and teacher of natural history. Famous for his studies on fishes and glaciers. Established the Museum of Comparative Zoology at Harvard University. Initiated the first field laboratory in biology.

ALEXANDER THE GREAT. 356-323 B.C.

King of Macedonia and conqueror of the Persian Empire. Born in Macedonia and died in Persia. His conquests were responsible for spreading Greek culture throughout the Eastern world.

AMBROSE. 340-397 A.D.

Educated for government service, he became governor of a Roman province with Milan as capital. Was appointed Bishop of Milan, and was influential in church-state relationships. Wrote extensively on theology, but drew from Plato and Origen and Basil, and was influential in Augustine's thinking. Much of his writing was allegorical.

AQUINAS, THOMAS. 1225-1274 A.D.

Great medieval scholar; did extensive systematization of Roman Catholic theology. Studied in Italy and France; taught in Paris; lectured in the Papal Court.

ARISTARCHUS, of Samothrace. c220-c143 B.C.

Greek grammarian; studied in Alexandria; was chief librarian in Byzantium.

ARISTOTLE. 384-322 B.C.

Greek philosopher and biologist; studied under Plato in Athens. Traveled widely; head of the Peripatetic School in the Lyceum in Athens. Generally recognized as the most profound intellect of all time.

AUGUSTINE, AURELIUS. 354-430 A.D.

The dominant personality of the early Western church; one of the greatest thinkers of Christianity. His thought fused the New Testament teachings with Greek Platonism. Taught rhetoric at Milan, where he came under the influence of Ambrose, by whom he was baptized; became Bishop of Hippo in North Africa. His philosophy had profound influence in establishing Catholic theology.

AVERROES. 1126-1198 A.D.

The outstanding representative of Arabic philosophy in Spain. Born in Cordova; died in Morocco.

AVICENNA. 980-1037 A.D.

Persian philosopher and physician. Writer of large philosophical encyclopedia and other works. Born in Turkistan; died in Hamadan.

BACON, FRANCIS. 1561-1626 A.D.

Lord Chancellor of England; philosopher, psychologist, and writer.

BACON, ROGER. c1220-c1291 A.D.

English scientist and writer. One of the first to advocate experimental work in science. Lecturer on Aristotle.

BASIL, THE GREAT. c330-379 A.D.

Cappadocian Father; founder of monasticism; writer on theology.

BATESON, WILLIAM. 1861-1926 A.D.

British biologist; founder of the science of genetics.

President of the British Association for the Advancement of Science, 1914.

BAUHIN, JEAN (1541-1613 A.D.) and GASPARD (1550-1614 A.D.)

French botanists, brothers, who published extensive works on plants. Their influence did much to promote the development of modern botany.

BERNARD, CLAUDE. 1813-1878 A.D.

French physiologist, one of the greatest of the 19th century. Louis Napoleon invited him to a professorship at the *Jardin des Plantes* in Paris. He published 17 volumes of lectures, describing his researches on various physiological functions.

BONNET, CHARLES. 1720-1793 A.D.

Swiss naturalist who discovered parthenogenesis in aphids. He did extensive research on plant nutrition. Because of failing eyesight, he turned to philosophy, by which he attempted to develop principles of Christianity.

BOUCHER DE PERTHES, JACQUES. 1788-1868 A.D.

French archaeologist whose discovery of flints in the Somme River gravels led to the establishment of the existence of prehistoric man. His conclusions were recognized in 1859, the same year as the publication of Darwin's *Origin of Species*.

BRAHE, TYCHO. 1546-1601 A.D.

Danish astronomer who wrote on the motions of the sun and moon, and published tables of fixed stars. Held a middle ground between the Ptolemaic and Copernican systems.

BRUNO, GIORDANO. 1548-1600 A.D.

Italian philosopher who attacked Aristotelianism. Lectured at Paris and Oxford; taught in Wittenberg. Was burned at the stake in Italy.

BUCKLAND, WILLIAM. 1784-1856 A.D.

English geologist who did systematic study of the geology of Great Britain. Fellow of the Royal Society; president of the Geological Society; professor of geology at Oxford.

BUFFON, GEORGES. 1708-1788 A.D.

French naturalist and author. His *Histoire Naturelle* (1749-1804) in 44 volumes was an encyclopedic work, although it contained many errors.

BURNET, THOMAS. c1635-1715 A.D.

Anglican theologian whose fanciful *Sacred Theory of the Earth* attracted much attention.

CATCOTT, ALEXANDER. 1725-1779 A.D.

Lecturer; author of *Treatise on the Deluge*, 1761.

CESALPINO, ANDREA. 1519-1603 A.D.

Italian botanist who instituted the system of classifying plants by fruit and seed characters. His work *De Plantis* (1583) was the source from which later scholars derived their ideas of botanical arrangement.

CHAMBERS, ROBERT. 1801-1871 A.D.

Scottish author; cofounder of Chambers' Encyclopedia. Author of *Vestiges of Creation*.

CLARK, AUSTIN H. 1880-1954 A.D.

American biologist; member of the staff of Smithsonian Institution, 1908-1950, and many other organizations. Author of books and around 600 scientific articles in five languages.

CLEMENT, of Alexandria. c150-c215 A.D.

Early Christian theologian; taught at Alexandria; defended Christianity against paganism, but his writings were influenced by Origen.

COPERNICUS, NICOLAUS. 1473-1543 A.D.

Polish astronomer whose theory of the revolution of the earth about the sun created a new era in astronomy. His views became known as the Copernican System, and

were adopted and advocated by Galileo.

CUVIER, GEORGES. 1769-1832 A.D.

French naturalist; founder and comparative anatomy and paleontology head of *Jardin des Plantes* in Paris. Active in government work. Prolific writer on scientific subjects; author of classic "catastrophism" in geology.

DARWIN, CHARLES. 1809-1882 A.D.

English naturalist who established the theory of organic evolution. His book, the *Origin of Species*, was the most monumental work on the species problem. He was buried in Westminster Abbey.

DARWIN, ERASMUS. 1731-1802 A.D.

English poet and scientist; and outstanding physician; grandfather of Charles Darwin and Francis Galton. His *Zoonomia* foreshadowed the evolutionary interpretation.

DA VINCI. *See* VINCI.

DEMOCRITUS. c470-?B.C.

One of the founders of Greek atomism. His philosophical writings have been favorably compared with those of Aristotle, and he wrote extensively on scientific subjects.

DESCARTES, RENE. 1586-1650 A.D.

French philosopher who wrote exhaustively on a wide range of subjects—mathematics, physics, biology, and theology. He upheld Copernicus in his views of the earth's movement around the sun. He is reckoned as one of the world's greatest analytical minds.

DE VRIES, HUGO. 1848-1935 A.D.

Dutch botanist and geneticist who introduced the experimental method into the study of plant evolution. One of the three re-discoverers of Mendel's laws of heredity in 1900.

DIOSCORIDES. c50 A.D.

Greek physician; author of *De Materia Medica*, used in pharmacology for 1600 years. He described about 600 medicinal plants, and his treatises, translated into English, stimulated modern systematic botany.

DUBOIS, EUGÈNE. 1858-1940 A.D.

Dutch university professor of anatomy and geology at Amsterdam. He discovered *Pithecanthropus erectus*, the "erect ape-man" or Java man.

EMPEDOCLES. c490-430 B.C.

Greek philosopher, of Sicily. His theory of primary substances was one of the earliest materialistic interpretations of the world.

EPICURUS. 341-270 B.C.

Greek philosopher who wrote on atomism and the soul. He was the founder of the Epicurean School, which was held in his garden at Athens. He advocated a return to nature and natural pleasures and renouncing strife for supremacy.

ERIGENA, JOHN SCOTUS. c810-877 A.D.

Irish philosopher and theologian; a highly learned man for his times. His discussions of creation stand forth as the central theme of his theology.

GALILEO, GALILEI. 1564-1642 A.D.

Italian astronomer, physicist, and mathematician. He was the first to study the skies with a telescope, which he had helped to improve. Supported the Copernican system. Did pioneer work on gravitation.

GALTON, FRANCIS. 1822-1911 A.D.

English scientist, noted for his statistical studies on heredity.

GEOFFROY, SAINT-HILAIRE ETIENNE. 1772-1844 A.D.

French naturalist; co-author with Cuvier on natural history. Member of the French Academy of Science. He and Georges Cuvier differed radically on interpretation

of animal composition.

GOETHE, JOHANN. 1749-1832 A.D.

German writer, scientist, and philosopher. Much debated, his ideas influenced the development of the evolution theory.

GOLDSCHMIDT, RICHARD. 1878-1958 A.D.

German geneticist; director of the Kaiser Wilhelm Institute fur Biologie in Berlin for many years. During Hitler's regime he moved to the United States, where he taught at the University of California at Berkeley. A strong opponent of Darwinism, though an ardent evolutionist.

GREGORY, of Nyssa. c330-c395 A.D.

Philosopher and theologian of the Cappadocian Fathers. One of the greatest intellects of the 4th century A.D. He had great influence on the mystical tradition of the Eastern churches, and was himself influenced by Plato and Origen.

GREW, NEHEMIAH. 1641-1712 A.D.

English plant anatomist and physiologist who, with Malpighi, laid the foundations for plant anatomy. He was the first to recognize the function of stamens.

HAECKEL, ERNST. 1834-1919 A.D.

German zoologist; a strong advocate of evolution. Best known for the "biogenetic law" which he formulated.

HARVEY, WILLIAM. 1578-1657 A.D.

English physician who discovered the circulation of the blood. His studies on generation led to the famous formula—*omne vivum ex ovo*—all life from an egg.

HAYDEN, HORACE H. 1769-1844 A.D.

United States dentist; founder and first president of Baltimore College of Dental Surgery, the first of its kind. He was interested in geology, and wrote many essays on the subject.

HERACLITUS. c540-c480 B.C.

Ephesian philosopher who was one of the earliest to attempt a naturalistic interpretation of the phenomena of the world.

HIPPOLYTUS. c165-c235 A.D.

Roman theologian whose most important work *Philosophumena* pointed out that Christian heresies were traceable to false pagan philosophies. He was exiled because of his controversial writings.

HOOKE, ROBERT. 1635-1703 A.D.

English scientist, famous for his *Micrographia*—studies with the microscope. His research covered many fields of science.

HUTTON, JAMES. 1726-1797 A.D.

Scottish geologist who formulated the current uniformitarian hypothesis.

HUXLEY, THOMAS. 1825-1895 A.D.

English biologist and philosopher who strongly supported Darwin. His theological writings were largely critical of established Christian doctrine.

KANT, IMMANUEL. 1724-1804 A.D.

German philosopher. His *Critique of Pure Reason* taught that truth can be reached by reason alone without experience. His philosophical writings were enormous, and he is considered the most important philosopher of modern times.

KEPLER, JOHANNES. 1571-1630 A.D.

German astronomer who formulated the laws regarding planetary motion. He did extensive studies with respect to other aspects of astronomy and on mathematics.

KOLLIKER, RUDOLF ALBERT VON. 1817-1905 A.D.

Swiss embryologist and histologist, one of the first to recognize the cellular structure of tissues. He opposed Darwin's concept of evolution, and was inclined toward

the theory of sudden mutations.

LAMARCK, JEAN BAPTISTE. 1744-1829 A.D.

French naturalist; one of the first to propound a theory of evolution. He was professor at the *Jardin du Roi* (later *Jardin des Plantes*) in Paris. He did extensive work on developing invertebrate zoology. His theory of inheritance of acquired characters has been hotly debated.

LEAKEY, LOUIS S. B. 1903-1972 A.D.

English anthropologist, born in East Africa. Famous for explanation of Olduvai Gorge and discovery of *Zinjanthropus*.

LEEUVENHOEK, ANTON VAN. 1632-1723 A.D.

Dutch microscopist who made many remarkable discoveries with single lenses, which he manufactured himself. He reported to the *Philosophical Transactions* of the Royal Society of London, of which he was a member.

LEIBNITZ, GOTTFRIED WILHELM VON. 1646-1716 A.D.

German philosopher and mathematician who taught the doctrine of monads as the basic structure of the physical universe. He tried to reconcile his philosophy with the Christian religion.

LEUCIPPUS. 5th century B.C.

Greek philosopher whom Aristotle credited with the origin of the atomic theory. He denied this, but claimed that he was simply trying to adapt earlier theories to his own ideas.

LINNAEUS, CHARLES. 1707-1778 A.D.

The English name for the Swedish botanist Carl von Linné. He lectured at the University of Sweden at Uppsala; traveled widely in his botanical studies. Was the first to define genera and species and to use binomial nomenclature. *Systema Naturae*, 10th edition, 1758, is generally recognized as the beginning of our modern system of classification of plants and animals.

LUTHER, MARTIN. *c1483-1546 A.D.*

German Reformer who began the Protestant Reformation. His religious principles formed the basis for the various Lutheran churches.

LYELL, CHARLES. *1797-1815 A.D.*

British geologist whose textbook, *Principles of Geology*, laid the foundation for geology as a science. He wrote other books and papers. Set up the Tertiary system.

MALPIGHI, MARCELLA. *1628-1694 A.D.*

Italian physiologist who did extensive microscopical investigation.

MALTHUS, THOMAS. *1766-1834 A.D.*

English economist whose theory regarding population influenced Darwin regarding natural selection.

MELANCHTHON, PHILIPP. *1497-1560 A.D.*

German theologian and Reformer who prepared the Augsburg Confession. He was one of the most brilliant writers of the Reformation.

MENDEL, GREGOR. *1822-1884 A.D.*

Austrian monk who discovered the laws of heredity while breeding garden peas in the monastery garden at Brunn, Austria (now Brno, Czechoslovakia).

MILLER, HUGH. *1802-1856 A.D.*

Scottish theologian and geologist. He did work on fossil fishes and wrote on *The Old Red Sandstone* (1841). His *Footprints of the Creator* (1849) was an argument against evolution.

MILLER, WILLIAM. *1782-1849 A.D.*

Adventist preacher whose lectures were largely responsible for developing the doctrine of the second coming of Christ in our time. The Advent Christian and the Seventh-day Adventist churches are the principal bodies resulting from his work.

MORGAN, THOMAS HUNT. *1866-1945 A.D.*

American biologist who developed the theory of the gene. He was awarded the Nobel Prize in 1933 for his investigations in genetics. Most of his work was done at Columbia University and at the California Institution of Technology at Pasadena, California.

MURCHISON, RODERIC. 1792-1871 A.D.

British geologist; president of the British Geological Society and Director of the British Geological Survey. Of his geological writings his *Siluria* was doubtless the most famous. He did extensive explorations on the geology of the British Isles and of the Continent.

NAGELI, KARL WILHELM VON. 1817-1891 A.D.

Swiss botanist famous for his work on cells. He wrote papers on the anatomy of plants, and investigated their structures and reproductive functions.

NEWTON, SIR ISAAC. 1642-1727 A.D.

English scientist and mathematician. He made many discoveries, such as the binomial theorem, differential calculus, the law of gravitation, and many phenomena of optics. Made improvements in the telescope. His *Principia* is reputed to have marked the beginning of modern science.

OKEN, LORENZ. 1779-1851 A.D.

German naturalist and professor of medical sciences. His views on philosophy were similar to those of Kant.

ORIGEN. c185-c254 A.D.

Theologian of the early Christian church; associated with Ambrose and Clement. He wrote expositions of the Bible, and vindicated Christianity against pagan attacks. He was charged with many heresies of pagan origin.

OSBORN, HENRY FAIRFIELD. 1857-1935 A.D.

American paleontologist who was largely responsible for the development of the American Museum of Natural History in New York City. He published many works on fossils, including man.

OWEN, RICHARD. 1804-1892 A.D.

British biologist, vertebrate paleontologist, and comparative anatomist. He prepared a series of catalogs of the Hunterian collection in the Royal College of Surgeons, and taught at the College. He was made Superintendent of the Natural History Department of the British Museum.

PALEY, WILLIAM. 1743-1805 A.D.

English clergyman and philosopher, whose *Natural Theology* (1802) was one of the strongest ever written in support of teleology. The book was in reality an amplification of John Ray's *The Wisdom of God Manifested in the Works of Creation* (1691).

PARACELSUS (*Theophrastus Bombastus von Hohenheim*). c1490-1541 A.D.

Swiss physician and alchemist who established the place of chemistry in medicine.

PASTEUR, LOUIS. 1822-1895 A.D.

French chemist and microbiologist who proved that microorganisms cause fermentation and disease. Originated pasteurization and the use of vaccines for rabies and other diseases; worked on organisms responsible for the "sick wines" and silkworm disease. One of the most valuable contributors to modern science.

PHILO (*Philo Judaeus*). c30 B.C.-c40 A.D.

Jewish philosopher at Alexandria. His philosophy was close to that of Plato and the Stoics, and his aim was to reconcile Hebrew and Greek philosophy. While he recognized the Mosaic Scripture as absolute authority, he made many allegorical interpretations, a method borrowed from the Stoics.

PLATO. 427-347 B.C.

Greek philosopher, the greatest philosophical writer of all time. He founded the Academy at Athens, which persisted for several centuries after his death. His moral

and political doctrine was based on Socratic principles (see Socrates). His philosophy was that of *idealism*, a state of existence based on the "idea" or mind, which was above all sensual and material existence. His doctrine of the soul has persisted in the dogmas of practically all Christian faiths as the doctrine of the immortality of the soul. Many other of his ideas exerted a profound influence on Christian doctrine.

PLAYFAIR, JOHN. 1748-1819 A.D.

Scottish physicist and mathematician who in 1802 popularized Hutton's *Theory of the Earth*, and laid the foundation for Lyell's work.

PLINY THE ELDER. 24-79 A.D.

Roman scholar and philosopher. He authored *Natural History*, a series of thirty-seven books. Some of his material is scientifically accurate; much of it deals with marvels and the imaginary. His view of nature is pantheistic.

PLOTINUS. 205-270 A.D.

Roman teacher, writer, and philosopher. He studied philosophy in Alexandria, and founded Neo-Platonism, which dominated Greek philosophy for many years and deeply influenced Christian theologians. It was primarily a way of return to the "Good" through moral purification and intellectual enlightenment.

PRICE, GEORGE McCREADY. 1870-1963 A.D.

American teacher and author. His long career as "Crusader for Creation" gave him international fame as the outstanding 20th century advocate of the literal interpretation of creation and the Flood as described in Genesis. He wrote more than 25 books and hundreds of articles on the subject. He taught in several Seventh-day Adventist colleges, and was widely in demand as a lecturer. His work has had a profound influence on the recent development of creationism. He made some errors in geological interpretation, but no more than would be

expected of any pioneer in the field of "Flood Geology."

RAY, JOHN. 1627-1705 A.D.

English naturalist, one of the first to organize a systematic classification of plants and animals. He was the first to attempt to define species. His work had a definite influence on Linnaeus.

ROUSSEAU, JEAN JACQUES. 1712-1778 A.D.

French-Swiss moralist who had great influence in political and social theory. He eloquently described the beauties of nature and showed the virtue of chastity. He was one of the greatest writers of his age.

RUSSELL, BERTRAND. 1872-1969 A.D.

English philosopher, a modern advocate of atomism, rationalism, and a pragmatic approach to philosophy.

SAINT-HILAIRE. *See* GEOFFROY.

SEDGWICK, ADAM. 1785-1873 A.D.

English geologist; president of the Geological Society. Noted for his field studies on British geology, particularly in the lower Paleozoic.

SILLIMAN, BENJAMIN. 1770-1864 A.D.

American chemist and geologist, and Professor of Chemistry and Mineralogy at Yale College; founder and editor of *American Journal of Science and Art*.

SMITH, WILLIAM. 1769-1839 A.D.

English land surveyor, canal engineer, and geologist. His observations led to the method of identifying strata by their contained fossils. His geological map of England and Wales was the first of its kind. His fossils became the nucleus of the fossil collection of the British Museum.

SOCRATES. c470-399 B.C.

Greek philosopher; executed by drinking hemlock for corrupting the young and teaching impiety. Laid the foundation for Plato's teaching. Regarded as founder of the Cynics.

STENO, NICOLAUS (*Nils Steensen*). 1638-1686 A.D.

Danish physician and writer on geology; one of the first to recognize fossils as remnants of former life.

SUAREZ, FRANCISCO. 1548-1617 A.D.

Spanish theologian and philosopher whose writings did much to free the Catholic theology from medieval mysticism and speculation, and to establish the doctrine of "creationism" as a church dogma.

SWAMMERDAM, JAN. 1637-1680 A.D.

Dutch naturalist; first to describe the red blood corpuscles. He made the finest collection of microscopic observations ever published. These included elaborate studies on the structure of insects, and were published under the title of *Biblia Naturae*.

TERTULLIAN. c155-c220 A.D.

Christian writer who defended Christianity against paganism and internal heresies. He opposed the idea that God created the universe out of pre-existing matter. He strongly influenced theology.

THALES. c624-c545 B.C.

Greek philosopher and statesman. He introduced geometry into Greece, and was credited by Aristotle as the first to postulate a single material substance as the basic structure of the universe.

THEOPHILUS, SAINT. c180 A.D.

Bishop of Antioch who tried to create a theology by interpreting the Bible in relation to contemporary rhetoric and philosophy. He criticized Greek religion, philosophy, and poetry, but his works were soon forgotten, and were not revived for several centuries.

THEOPHRASTUS. 370-287 B.C.

Greek philosopher. He studied under Aristotle, whose philosophy he fully embraced. His *History of Plants* was one of the earliest botanical treatises known.

TOURNEFORT, JOSEPH. 1656-1708 A.D.

French botanist whose system of classification was popular until it was superseded by that of Linnaeus.

VINCI, LEONARDO DA. 1452-1519 A.D.

Florentine artist and scientist. He is noted for his remarkable anatomical drawings and for his engineering works besides his marvelous paintings. He was one of the first to recognize fossils for what they are, remnants of ancient life.

VIRCHOW, RUDOLF. 1821-1902 A.D.

German pathologist and anthropologist, noted for his microscopical pathology. His archeological works were on lake dwellings and prehistoric structures.

VOLTAIRE (*François Marie Arouet*). 1694-1778 A.D.

A prolific writer; a poet and philosopher. He was opposed to the religious and political "establishment," saying much against the Bible and the church. His elaborate literary works are not considered of much value because of superficiality.

WALLACE, ALFRED RUSSEL. 1823-1913 A.D.

British naturalist who proposed the principle of natural selection simultaneously with Darwin, while he was studying in Malaysia.

WEISMANN, AUGUST. 1834-1914 A.D.

German biologist. His theory of germplasm was in opposition to Darwinism.

WOODWARD, JOHN. 1665-1728 A.D.

English naturalist and geologist; author of *Natural History of the Earth* and a *Catalogue* describing rocks and minerals.

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